VOL. II NOVEMBER 1951 NO. 11

UNITED STATES ARMED FORCES MEDICAL JOURNAL

Published Monthly by the Armed Forces Medical Publication Agency, Department of Defense

WAYNE G. BRANDSTADT, *Colonel, MC, U. S. A., Editor-in-Chief*
ROBERT J. BENFORD, *Colonel, U. S. A. F. (MC), Associate Editor*
WILLIAM R. WHITEFORD, *Captain, MC, U. S. N., Associate Editor*

THE PRINTING OF THIS PUBLICATION HAS BEEN APPROVED BY THE DIRECTOR OF THE BUREAU OF THE BUDGET, OCT. 19, 1949

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1951

For sale by the Superintendent of Documents, U. S. Government Printing Office
Washington 25, D. C.

Foreword

The UNITED STATES ARMED FORCES MEDICAL JOURNAL represents the unification of the BULLETIN OF THE UNITED STATES ARMY MEDICAL DEPARTMENT and the UNITED STATES NAVAL MEDICAL BULLETIN. This joint periodical is the medium for disseminating information of administrative and professional interest to all medical personnel of the Department of Defense.

The Chairman of the Armed Forces Medical Policy Council and the Surgeons General of the several services invite all medical officers, dental officers, Medical Service Corps officers, Nurse Corps officers, and officers of the Veterinary Corps of the Armed Forces, and the medical consultants of the Army, Navy, and Air Force to submit manuscripts for publication in this JOURNAL.

W. RANDOLPH LOVELACE, II, M. D.,
Chairman, Armed Forces
Medical Policy Council,
Department of Defense.

GEORGE E. ARMSTRONG,
Major General, U. S. A.,
Surgeon General, U. S. Army.

LAMONT PUGH,
Rear Admiral, MC, U. S. N.,
Surgeon General, U. S. Navy.

HARRY G. ARMSTRONG,
Major General, U. S. A. F.,
Surgeon General, U. S. Air Force.

NOTICE TO CONTRIBUTORS

Contributions to the MEDICAL JOURNAL should be typewritten, double-spaced with wide margins on plain paper of standard letter size. Nothing should be written in the manuscript that is not intended for publication.

The MEDICAL JOURNAL endeavors to follow a uniform style in headings, captions, spelling, abbreviations, capitalizations, and the use of figures as set forth in the Government Printing Office Style Manual.

All illustrations should be unmounted. Pictures, prints, or drawings may be fastened on a sheet of paper by means of angular slits for each corner of the illustration; suitable identification can then be made on this sheet. Do not cut out portions of an illustration for reproduction. Photographs should be black and white glossy prints, preferably 4 by 5 or 8 by 10 inches to allow for reduction. Do not make any marks on the face or back of the photographs or drawings. Cellophane tape, staples, paper clips, or pins should not be used on illustrations. All charts and graphs must be drawn with black india ink on white paper; graph lines must not be in green or blue ink.

Contributions are to be the original work of the author. Quotations must be accurately and carefully copied and full credit must be given to the source. References, tables (charts), and legends must be double-spaced and on separate sheets. References should be listed according to the Quarterly Cumulative Index Medicus, A. M. A., and the sequence should be as follows: name of the author and initials; title of article; name of periodical; volume number; pages; and month and year. *Example:* Hinton, D., and Steiner, C. A.: Recurrent volvulus of sigmoid colon; unusual case report. Ann. Surg. 116: 147–149, July 1942. Authors are responsible for the accuracy of the bibliographic references.

The summary should be a factual and brief recapitulation of the observations or statements contained in the article. The conclusions drawn from the case, experiment, or facts set forth should be clearly stated and should appear at the close.

The editor is not responsible for the safe return of manuscripts and illustrations. All material supplied for illustration, if not original, must be accompanied by reference to the source and a statement that reproduction has been authorized. Recognizable photographs of patients should carry permission to publish.

All original contributions are accepted on the assumption that they have not appeared previously and are not to be reprinted elsewhere without the permission of the Editor, UNITED STATES ARMED FORCES MEDICAL JOURNAL, and that editorial privilege is granted to the UNITED STATES ARMED FORCES MEDICAL JOURNAL in preparing all material submitted for publication. Authors are urged to keep their articles short.

Address: U. S. Armed Forces Medical Journal, Bureau of Medicine and Surgery, Department of the Navy, Washington 25, D. C.

WAYNE G. BRANDSTADT, *Editor-in-Chief,*
Colonel, Medical Corps,
United States Army.

ROBERT J. BENFORD, *Associate Editor,*
Colonel, Medical Corps,
United States Air Force.

WILLIAM R. WHITEFORD, *Associate Editor,*
Captain, Medical Corps,
United States Navy.

Table of Contents

	Page
Goiter Heart—*Samuel H. Rosen*	1593
Articles by Personnel of the Medical Services of the Armed Forces Published in Other Journals	1608
Treatment of Nerve-Gas Casualties—*John R. Wood, Paul F. Dickens, Jr., John Rizzolo, and Milward W. Bayliss*	1609
Evolution of Medical Air Transport Policies—*Joseph A. Baird*	1619
Medical Experiences in Korea—*Donald E. Carle*	1623
Chemosurgery—*Gordon H. Ekblad*	1631
Proper Use of the Outpatient Clinic—*Warner F. Bowers*	1641
Roentgenographic Technics in Dentistry—*Francis P. Cassidy*	1643
Lymphogenous Cysts of the Mediastinum: Cystic Hygromas, Pericardial Cysts, and Pericardial Diverticulums—*Robert B. Brown and Robert G. Dunn*	1651
Multiple Eosinophilic Granuloma of Bone With Pulmonary Involvement—*Arnold J. Brody and James O. Gillespie*	1669
Eosinophilic Granuloma of the Rib—*Sanford W. French, III*	1681
Regional Enteritis—*Dan R. Sewell and John H. Wilkins*	1685
Management of the Neurogenic Bladder—*James C. Kimbrough*	1691
Vivax Malaria With Long Incubation Periods: Report of Seven Cases—*E. E. Eddleman, Jr., William H. Hale, and William M. Snowden*	1693
Present Concepts of Compensation for Fluid and Electrolyte Alteration—*Stuart H. Walker*	1699
Presacral Neurofibroma—*George Alvary*	1709
The Clinical Effects of Delta 5 Pregnenolone in Rheumatoid Arthritis—*Alton R. Higgins, Richard E. Jones, Jr., and Thomas W. D. Smith*	1717
Symmetrical Serous Synovitis—*Robert G. Thompson and Carl Z. Berry*	1723

Page

Cervical Spine Radiography—*Robert W. Augustine and Richard W. Eells* 1729

Primary Split-Skin Graft in the Treatment of Pilonidal Cysts—*Ellwood V. Boger and Edward W. Pinkham, Jr.* 1733

A Versatile Spinal Retractor—*Joseph W. Batch* 1737

Instrumental Perforation of Uterus—*John T. Parente, Albert L. May, and A. Galvez* 1739

Unusual Corneal Foreign Body—*William R. True* 1741

BOOKS RECEIVED 1743

BOOK REVIEWS 1607
1617, 1618, 1640, 1650, 1667, 1668, 1680, 1684, 1690, 1716, 1727, 1728, 1732, 1736, 1742, 1751

OFFICE OF THE SECRETARY OF DEFENSE
ARMED FORCES MEDICAL POLICY COUNCIL
WASHINGTON 25, D.C.

MEMO: Personnel of the Medical Services of the United States Armed Forces

A program for expanding the hospital facilities of the Defense Establishment has been prepared by the Armed Forces Medical Policy Council after coordination with the three departments. Its purpose is to insure an adequate number of beds and efficient utilization of medical facilities with elimination of unnecessary duplication. The program for the current year was approved by the Secretary of Defense on 2 May 1951 and by the President on 11 May 1951. Programs for the future will be prepared annually and submitted for approval in a similar manner.

Extensive studies are being carried out to develop more modern and efficient plans for hospital construction. New criteria based on missions to be accomplished are being established. Experience in dealing with military medical problems in peace and war, as well as opinions derived from civilian sources on present trends affecting hospital construction, are being carefully evaluated in the light of current and anticipated requirements. The desired goal is to determine the most efficient type of construction in terms of cost and services rendered and to adopt it for the Defense Establishment.

W. Randolph Lovelace, II

W. Randolph Lovelace, II, M. D.
Chairman

Goiter Heart[1]

Samuel H. Rosen, M. D. (1)

THE ASSOCIATION of heart disease with disease of the thyroid has been known since the early descriptions of thyroid disease. Parry (2), who in 1786 observed what he believed to be the first case on record of a malady later known as exophthalmic goiter, placed the principal emphasis on this association and recorded 8 such cases. That was about 50 years before the disease was more completely re-described, by Graves in 1835 and, more definitively, by Basedow in 1840. The introduction of the term "goiter heart" has been attributed to Adelmann (3). Although most of the early literature is in foreign journals, much of the later work since the beginning of this century, is reported in the American literature (4).

Goiter heart does not signify a single pathologic entity. In fact, its connotation has been vague, and the ideas as to its pathogenesis quite varied (5-18). Reports using the term "goiter heart" refer to a number of pathologic states which have in common an enlargement, but

---

(1) From the Laboratory Division, Montefiore Hospital, New York, N. Y.; presented as a lecture at U. S. Naval Hospital, St. Albans, Long Island, N. Y.

(2) Parry, C. H.: Collections from the unpublished medical writings of the late Caleb Hillier Parry. Underwoods, London, 1825. vol. II, pp. 111-125.

(3) Ginsberg, A. M.: Historical development of present conception of cardiac conditions in exophthalmic goiter. Ann. Int. Med. 5: 505-517, Oct. 1931.

(4) Symposium on the Thyroid Heart: Am. Heart J. 8: 1-154, Oct. 1932.

(5) Rose, E.: Ueber den Kropftod und die Radicalcur der Kröpfe. Arch. f. klin. Chir. 22: 1-71, 1878.

(6) Schranz, J.: Beiträge zur Theorie des Kropfes. Arch. f. klin. Chir. 34: 92-159, 1887.

(7) Wölfler, A.: Die chirurgische Behandlung des Kropfes. August Hirschwald, Berlin, 1890. II, p. 82.

(8) Kraus, F.: Ueber das Kropfherz. Wien. klin. Wchnschr. 12: 416-421, Apr. 1899.

(9) Minnich, W.: Das Kropfherz, und die Beziehungen der Schilddrüsenerkrankungen zu dem Kreislaufapparat. F. Deuticke, Leipzig und Wien, 1904. IV, 1.

(10) Blauel: Ueber das Verhalten des Herzens bei Struma. Beit. z. klin. Chir. 62: 119-208, Mar. 1909.

(11) Scholz, W.: Ueber das Kropfherz. Berl. klin. Wchnschr. 46: 381-385, Mar. 1909.

(12) Bircher, E.: Weitere histologische Befunde bei durch Wasser erzeugten Rattenstrumen und Kropfherzen. Deutsche Ztschr. f. Chir. 112: 368-424, Nov. 1911.

(13) Bauer, J.: Die Herzstörungen bei endemischem Kropf. Deutsche med. Wchnschr. 38: 1966-1971, Oct. 1912.

(14) Crotti, A.: The goiter heart. Ohio State M. J. 8: 61-66, Feb. 1912.

(15) Andrassy: Ueber Kropf und Kropfherz. Beitr. z. klin. Chir. 104: 35-45, 1917.

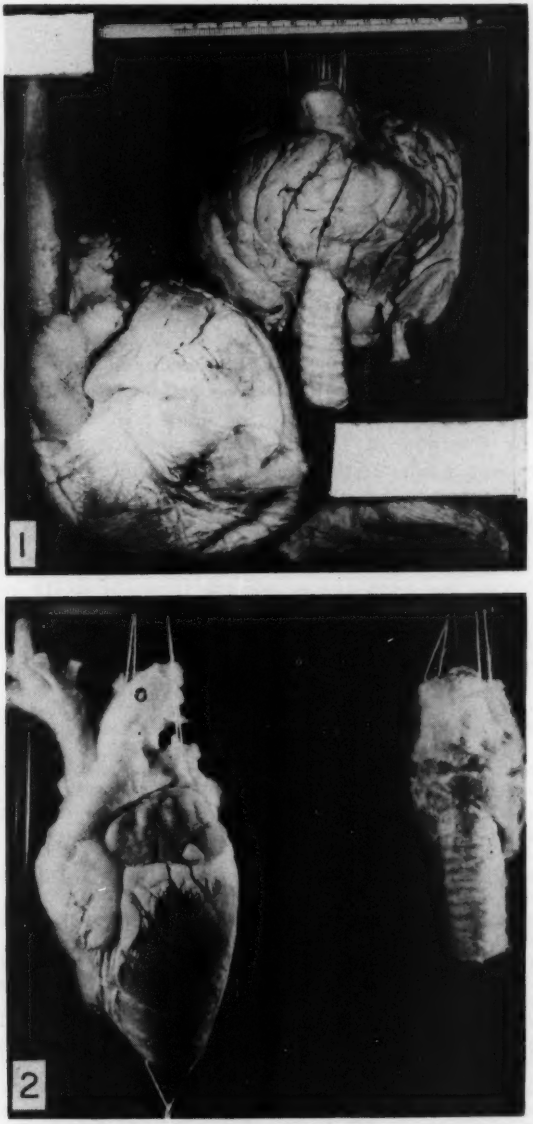


Figure 1. Mechanical goiter heart in newborn cretin calf. Left: *Enlargement (mostly hypertrophy) of left and right sides of heart and enlargement of artery and vein between heart and thyroid gland.* Right: *Large simple hyperplastic goiter causing slight lateral compression of trachea. Figure 2. Normal heart and thyroid gland of newborn calf.*

not necessarily a palpable enlargement, of the thyroid. These pathologic states may be classified as (17): (1) mechanical or true goiter heart, associated with simple hyperplastic (parenchymatous) goiter without hyperthyroidism (endemic or sporadic goiter); and (2) toxic goiter heart, associated with an exophthalmic goiter. In earlier articles, frequently clear distinction was made between the two types (11, 13, 14) because a confused state of knowledge of thyroid disease itself existed and, because of failure to recognize coexistent independent heart disease. Goiter heart, today, generally refers to the latter type, for which the terms *thyrocardiac disease* and, more specifically, *thyrotoxic heart disease* seem to be in vogue at present.

Neither type of goiter heart lends itself to demonstration with human material. The first type is now rare. Since the advent of iodine prophylaxis in the early part of the twentieth century large simple goiters with goiter hearts are rarely encountered even in such formerly endemic goiter regions as Switzerland, the Great Lakes and the Pacific Northwest regions. The heart in Graves' disease usually shows little or no specific anatomic change either grossly or microscopically. As a clinical entity the toxic goiter heart appears to be diminishing (19). We have resorted, therefore, to animal material to illustrate this subject. The so-called myxedema heart is omitted from this discussion because, although a form of thyroid heart disease, it is not in the category of goiter heart.

MECHANICAL OR TRUE GOITER HEART

Mechanical or true goiter heart has been seen in mammals, birds, and fish, in association with simple hyperplastic goiter, spontaneous or experimental (17). It is seldom seen to day in man or spontaneously in animals because endemic goiter is no longer prevalent. Figures 1 and 2 show the contrast between a mechanical goiter heart in a newborn cretin calf (Cleveland 1912-D. Marine) and the heart and thyroid of a newborn normal calf. Microscopic examination of the goiter heart shown here revealed only hypertrophy of the myocardial fibers. Figure 3 shows the contrast between a mechanical goiter heart in an adult chicken (D. Marine) and the heart and thyroid of a normal adult chicken. The former shows enlargement (most hypertrophy) of the left and right sides of the heart; enlargement of the artery and vein between the heart and thyroid; and one lobe of a large, spontaneous, simple goiter. Microscopic examination of the heart showed only hypertrophy of the myocardial fibers.

(16) Wegelin, C.: In Henke, F., and Lubarsch, O. (editors): Handbuch der speziellen pathologischen Anatomie und Histologie. Achter Band—Drüsen mit inner Sekretion. Julius Springer, Berlin, 1926. pp. 424-427.

(17) Marine, D.: Diseases of the thyroid and parathyroid glands. In Tice, F. (editor): Practice of Medicine. W. F. Prior Company, Inc., Hagerstown, Md., 1932. pp. 216, 242, 259.

(18) Bishop, L. F., Jr.: Review of progress in study of goiter heart. Tr. Third Internat. Goiter Conf. & Am. A. Study Goiter. pp. 346-354, 1938.

(19) Kepler, E. J.: Heart in hyperthyroidism. Tr. Am. A. Study Goiter. pp. 106-112, 1940.

Table 1 (rabbits 4 and 5) illustrates the mechanical goiter heart in adult rabbits. The characteristic features of this form of goiter heart are enlargement of the heart, usually hypertrophy and dilatation of both sides, and enlargement of the arteries and veins between the thyroid and the heart, the degree of enlargement varying, in part, with the size and duration of the goiter (*17*). There are no typical microscopic changes in the heart other than the hypertrophy of muscle fibers. The degenerative and inflammatory changes described by some in both human and animal hearts would appear to be attributable to intercurrent toxic, infectious, and other processes (*16, 20*). The cardiac enlargement appears to be entirely a work hypertrophy, which usually is associated with few or no symptoms (*13*) and may progress to congestive failure from overwork. The more severe manifestations as well as the greater incidence of the mechanical goiter heart and also of the toxic goiter heart occur in older people (*10*). The great increase in vascularity of the hyperplastic thyroid, as evidenced grossly by the marked hyperemia, pulsation of enlarged vessels, and bruit, enormously increases its blood flow. In fact, as much as half the output of the heart may be shunted through the gland (*17*). This results in an increased venous return to the heart, which means that the heart must work harder in order to maintain an efficient systemic circulation. There is, in fact, a close analogy, in many respects, between the effects on the heart of a large hyperplastic thyroid and of an arteriovenous fistula. In both there is increased venous return with enlargement of the heart and of the proximal arteries and veins and, characteristically, no anatomic damage of the myocardium. In both there may be eventual heart failure. Surgical obliteration of the fistula, and iodine involution of the hyperplastic goiter (*21*), or surgical removal of the goiter (*16*) (table 1, rabbit 6), generally result in return of the heart and blood vessels toward normal size and relief of the heart failure. In the case of a goiter this occurs in spite of the fact that the colloid thyroid gland which results from iodine treatment of a hyperplastic gland may be as large as, or even larger than, the original goiter. It is no longer a gland of greatly increased vascularity. This fact supports the vascular shunt theory of the mechanism of cardiac enlargement in hyperplastic goiter.

In some instances, even a colloid as well as a hyperplastic goiter, if sufficiently large and properly situated (for example a substernal or thoracic goiter) may compress large thoracic vessels and the trachea (a stenosing goiter), and cause dyspnea, pulmonary emphysema, and bronchiectasis, and give rise to an enlarged heart. The enlargement is attributed both to inspiratory dyspnea which produces increased sucking of venous blood into the thorax with overfilling of the right heart, and to expiratory dyspnea which causes pulmonary emphysema and bronchiectasis, but this is essentially a right-sided enlargement, a cor pulmonale.

(*20*) Weller, C. V.; Wanstrom, R. C.; Gordon, H.; and Bugher, J. C.: Cardiac histopathology in thyroid disease; preliminary report. Am. Heart J. 8: 8-18, Oct. 1932.

(*21*) Feer, E.: Kropfherz und Thymusherz der Neugeborenen und Säuglinge. Monatschr. f. Kinderh. 25: 88-104, Mar. 1923.

It was referred to as the *pneumonic* or *dyspneic type* of mechanical goiter heart and early received the principal emphasis (5, 9). It did not respond to thyroidectomy as satisfactorily as the other type of mechanical goiter heart because of the concomitant pulmonary damage.

Other mechanical factors of a more theoretical nature were implicated in the cardiac enlargement due to goiter. One of these was the pressure of a large goiter, particularly at the thoracic inlet, on the vagal and sympathetic innervation of the heart which produced either a slowing of the heart with increased filling, or an acceleration of the heart. This was referred to as the *neuropathic goiter heart* (7, 15). Menne et al. (22) produced pathologic changes in the rabbit's heart similar to those of experimental hyperthyroidism by surgically destroying the depressor nerve mechanism of the heart and thus greatly increasing the heart rate. Another mechanical factor believed to be responsible for the cardiac enlargement of goiter heart was a vasoparalytic state, attributed to the goiter, which produced (1) hyperemia of the heart muscle, with resultant excitation of the myocardial nerve ganglia; (2) increased activity of the heart; and (3) cardiac hypertrophy, dilatation, and degeneration (6, 7).

Summary. Of the various theories of the pathogenesis of mechanical goiter heart Marine's vascular shunt theory is well supported by facts, and would explain most instances of mechanical goiter heart, including the large proportion of cases reported earlier which were not explained by the usual theories, but were variously attributed to such things as: (1) early or intermediate phases of Basedow's disease (7), (2) formes frustes of Basedow's disease (8), (3) Basedowified goiters, (4) thyroid poisoning which was a torpid form of goiter heart as distinguished from the overexcitable form of Basedow's disease (13), and (5) a general intoxication which was responsible for the changes in the heart as well as in the thyroid (11, 12, 14). The pneumonic or dyspneic type of mechanical goiter heart due to a stenosing goiter may account for a certain number of goiter hearts with right-sided enlargement alone. The neuropathic theory, and the theory of myocardial hyperemia are highly theoretical and not readily supported. Some early authorities maintained that a pure form of goiter heart did not exist (16). Although a pure mechanical goiter heart does exist, particularly in animals, as illustrated above, and in newborn and infant children (16, 21), it is entirely reasonable to acknowledge the occurrence of goiter heart due to a combination of the first two mechanical factors, and that these, particularly the first, may also play a part in toxic goiter heart. Blauel (10) many years ago described, as one type of goiter heart, a combination of the mechanical and the toxic goiter hearts.

(22) Menne, F. R.; Jones, O. N.; and Jones, N. W.: Changes in myocardium of rabbits from augmenting heart rate mechanically and from induced hyperthyroidism. Arch. Path. 17: 333-355, Mar. 1934.

TABLE 1. *Mechanical and toxic*

Rabbit no., sex, and breed	Simple goiter			Treatment	Result	Age at death (mos.)
	Size or weight (grams)	Duration (mos.)	How acquired			
1 F. B. (a) (g)	6+ (b)	3+	Spontaneous (e)	Removed right lobe (2.92 gm., marked hyperplasia) 20 days before death. KI 22 mg. in divided doses, in 8 days, intraperitoneally, beginning 14 days before death	Severe hyperthyroidism. Congestive heart failure	6½
2 (g)	6+ (b)	9+	Cabbage diet (j)	KI 3 successive daily doses intraperitoneally beginning 26 days before death	Severe hyperthyroidism	12
3 M. B. (a) (g)	7+ (b)	3+	Spontaneous (e)	Removed left lobe (3.5 gm., marked hyperplasia) 14 days before death. KI 21 mg. in 11 doses, 12 days, intraperitoneally beginning 14 days before death	Severe hyperthyroidism	6½
4 M. B. (a) (h) (i)	Moderate	11+	Spontaneous (e)	None	------	14
5 M. D. (h)	Large	12+	Methyl cyanide (d)	None	------	15
6 M. B. (a) (h)	Large	12+	Spontaneous (e)	Thyroidectomized at 15 mo.	------	29

* This data as well as the specimens in figure 4 resulted from experiments on the pathogenesis of simple goiter and exophthalmos.

(a) Litter mates.

(b) Very vascular on surgical inspection.

(c) Average weight of normal rabbit thyroid is 0.2 gm.

(d) Marine, D., and Baumann, E. J.: Further studies on etiology of goiter; effect of cyanides. Tr. A. Am. Physicians 47: 261-267, 1932.

(e) On diet of alfalfa hay and oats of low iodine content. (Marine D.: Pathogenesis and prevention of simple or endemic goiter. J.A.M.A. 104: 2334-2341, June 29, 1935.)

*goiter hearts in rabbits**

Body weight at death (gms.)	Loss of body weight (gms.)	Thyroid		Heart		
		Weight (gms.) (c)	Histology	Weight (gms.) (f)	Gross	Histology
1,642	713	Left lobe 1.09	Colloid, involuted	9.1	Hypertrophy and dilatation of right and left sides	Hypertrophy of myocardial fibers, focal fatty degeneration and necrosis, focal replacement fibrosis
1,505	1,130	Decrease in size	Colloid, involuted	8.4	Hypertrophy and dilatation of right and especially left sides	Hypertrophy of myocardial fibers, focal fatty and hyaline degeneration, patchy myocardial fibrosis
1,755	750	Right lobe 2.3	Colloid, involuted	7.4	Mainly hypertrophy of right and left sides	Hypertrophy of myocardial fibers, focal fatty degeneration and focal institial fibrosis
2,720	----	1.09	Moderate hyperplasia, involuting	7.1	Hypertrophy and dilatation of right and left sides	Hypertrophy of myocardial fibers and insignificant lymphocytic infiltration.
2,311	----	6.2	Moderate hyperplasia involuting	6.3	Hypertrophy and dilatation of right and left sides	------
3,018	----	Absent (surgically)	------	5.9	Pale and flabby	------

(f) Average weight of normal rabbit heart (B & D breeds) of 1,500 to 2,000 gm. is 4 to 5 gm.; of 2,000 to 2,500 gm. is 4.5 to 5.5 gm.; of 2,500 to 3,000 gm. is 5 to 6 gm.

(g) Rabbits 1, 2, and 3 died of fulminating hyperthyroidism.

(h) Rabbits 4, 5, and 6 were sacrificed.

(i) Rabbit 4 had a chronic infection of the jaw; all the others were free of infections.

(j) Marine, D.; Baumann, E. J.; and Cipra, A.: Studies on simple goiter produced by cabbage and other vegetables. Proc. Soc. Exper. Biol. & Med. 26: 822-824, June 1929.

B - Belgian, D - Dutch; F - female, M - male.

TOXIC GOITER HEART

The more important type of goiter heart is the toxic or thyrotoxic type. It is associated with Graves' disease, but it is not a well-defined entity. Kraus (*8*) first differentiated the two types of goiter heart. The part that hyperthyroidism plays is uncertain (*4*). The problem is whether hyperthyroidism produces a distinct form of heart disease, or whether it is merely a contributory factor in the presence of established heart disease. Clinically the term "toxic goiter heart" or "thyrotoxic heart disease" is applied to patients with hyperthyroidism associated with auricular fibrillation, congestive heart failure, or angina. These cardiac findings may completely obscure the underlying Graves' disease and simulate primary heart disease (so-called masked hyperthyroidism). In human hearts hyperthyroidism per se produces few or no demonstrable organic changes. Evidence has been presented that the thyroid hormone acts either directly on the heart muscle or on the terminal nerve endings (*23*), and has a "heart accelerator" factor in addition to the factor which increases metabolism (*24*). The heart may be moderately hypertrophied or dilated, or both. This may be generalized or limited to the left side and may include the great vessels between the thyroid and heart. There is some difference of opinion as to the incidence of these abnormalities. The greater enlargement of the heart occurs in about 50 percent of patients with Graves' disease complicated by hypertension, coronary artery disease, or rheumatic heart disease. The occurrence of this enlargement is more frequent in the presence of congestive failure (*25*). The myocardium in Graves' disease, on microscopic study shows (1) hypertrophy of fibers, (2) fatty and hyaline degeneration of the fibers, (3) infiltration with cells, and (4) occasionally necrosis and fibrosis (*26-30*). With few exceptions all the pathologic changes are associated with a coexisting heart disease or may be seen as frequently in hearts presumed to be normal (*20, 25, 31*).

(*23*) Markowitz, C., and Yater, W. M.: Response of explanted cardiac muscle to thyroxine. Am. J. Physiol. 100: 162-166, Mar. 1932.

(*24*) Meyer, A. E., and Marine, D.: Action of pathological thyroids from rabbits and sheep on metabolism and heart rate in thyroidectomized rats. Endocrinology 30: 558-563, Apr. 1942.

(*25*) Friedberg, C. K., and Sohval, A. R.: Occurrence and pathogenesis of cardiac hypertrophy in Graves' disease. Am. Heart J. 13: 599-618, May 1937.

(*26*) Askanazy, M.: Pathologisch-anatomische Beiträge zur Kenntnis des Morbus Basedowii, insbesondere über die dabei auftretende Muskelerkrankung. Deutsches Arch. f. klin. Med. 61: 118-186, Sept. 1898.

(*27*) Fahr, T.: Histologische Begunde an Kropfherzen. Zentralbl. f. allg. Path. u. path. Anat. 27: 1-5, Jan. 1916.

(*28*) Goodpasture, E. W.: Myocardial necrosis in hyperthyroidism. J.A.M.A. 76: 1545-1551, June 4, 1921.

(*29*) Hashimoto, H.: Heart in experimental hyperthyroidism with special reference to its histology. Endocrinology 5: 579-606, Sept. 1921.

(*30*) Lewis, W.: Question of specific myocardial lesion in hyperthyroidism (Basedow's disease). Am. J. Path. 8: 255-262, Mar. 1932.

(*31*) Rake, G., and McEachern, D.: Study of heart in hyperthyroidism. Am. Heart J. 8: 19-23, Oct. 1932.

The repeated clinical observation that, in young patients with otherwise normal hearts, Graves' disease may exist for several years without any evidence of cardiac insufficiency supports the belief that uncomplicated hyperthyroidism produces no specific organic lesions of the heart. Means (32) cites a case of 17 years' duration. Thyrotoxic heart disease with its accompanying auricular fibrillation, enlargement and congestive heart failure is usually encountered in patients over 40 years of age. It is then present because of some other disease such as hypertension, arteriosclerosis, syphilis, or senescence (33). Of 108 patients with thyrotoxic heart disease studied by Barker et al. (34) the average age was 51.5 years. When cardiac manifestations occur in younger patients it is usually on the basis of rheumatic heart disease. Hyperthyroidism aggravates the organic lesions of these diseases and they become clinically manifest. It is a contributory or precipitating factor in causing the decompensation of compensated organic heart disease (35). The hyperthyroidism not only increases the demand on the heart for work but also decreases the ability of the heart to perform increased work. An increase in the heart rate caused by the direct action of the thyroid hormone on the myocardium (23, 24, 36), and by the elevation of the general body metabolism both cause an increase in cardiac output. This is evidenced clinically by an increased pulse rate, a widened pulse pressure, an increased minute volume, an increased blood volume, a rapid peripheral blood flow, an increased venous return, and an abnormal response to exercise or other stress (19, 37). The decreased cardiac reserve is caused by impaired nutrition of the myocardium which results from a decreased reserve supply of (1) glycogen (35, 37), (2) creatine (38), (3) phosphates (39), and (4) adenyl-pyrophosphoric acid (40) and an increase of the concentration of lactic acid (35) and nonprotein nitrogen (41). A decrease in the body stores and intake of

(32) Means, J. H.: The Thyroid and Its Diseases. J. B. Lippincott Co., Philadelphia, Pa., 1937. p. 429.

(33) Maher, C. C., and Sittler, W. W.: The cardiovascular state in thyrotoxicosis. J.A.M.A. 106: 1546-1557, May 1936.

(34) Barker, P. S.; Bohning, A. L.; and Wilson, F. N: Auricular fibrillation in Graves' disease. Am. Heart J. 8: 121-127, Oct. 1932.

(35) Andrus, E. C.: Heart in hyperthyroidism: clinical and experimental study. Am. Heart J. 8: 66-74, Oct. 1932.

(36) de Wesselow, O. L. V. S., and Griffiths, W. J.: Rôle of adrenal gland and of raised metabolism in production of organ hypertrophy in thyroid-fed rat. Brit. J. Exper. Path. 19: 347-353, Oct. 1938.

(37) Defauw, J.: Sur les variations du glycogène cardiaque chez l'animal en hyperthyroidie expérimentale. Compt. rend. Soc. de Biol. 105: 228-230, Oct. 1930.

(38) Bodansky, M., and Pilcher, J. F.: Creatine content of heart in experimental cardiac hypertrophy due to hyperthyroidism. Proc. Soc. Exper. Biol. & Med. 32: 597-598, Jan. 1935.

(39) Mattonet, C.: Chemischer Beitrag zur Frage der Herzmuskelschädigung durch Thyroxin. Ztschr. f.d. ges. exper. Med. 90: 237-244, 1933.

(40) Berg, H.: Ueber den Herzmuskelstoffwechsel bei Hyperthyreose und seine Beeinflussung durch Vitamin C. Arch. f. exper. Path. u. Pharmakol. 185: 359-367, 1937.

(41) Steppun, O. A.; Naumova, N.; and Ugarova, N.: Chemical and pharmacodynamic characteristics of heart in hyperthyroidism. Klin. Med. 13: 1285-1291, Sept. 1935.

vitamins, especially B_1 and C *(32, 42, 43)* and a decrease in coronary blood flow due to relatively low diastolic pressure disturb the metabolism of the cardiac muscle further.

The heart muscle, like the skeletal muscles, may be actually weaken ined Graves's disease *(19)*. The degree of this myocardial weakness may be variable. It is not surprising that cardiac failure is reported in some cases of Graves' disease without evidence of organic heart disease because of the impaired functional capacity and the increased work of the heart *(19, 44)*. The occasional finding of significant myocardial lesions in Graves' disease uncomplicated by other heart disease may also be explained on the same basis *(22)*. The situation is, in a limited sense, analogous to that in hypertensive heart disease in which focal myocardial degeneration, necrosis, and fibrosis result when the coronary blood supply of the myocardium does not keep pace with the increased need of the hypertrophied cardiac musculature occasioned by the increased work of the heart. It is also possible, as suggested on both clinical and experimental grounds *(22, 31, 43, 45)* that the heart in hyperthyroidism is more susceptible to injury by even mild intoxications and infections. All these factors may produce structural changes in the heart by augmenting the effect of concomitant cardiovascular disease. If the hyperthyroidism is cured, the cardiac disturbances, even though they may be due to independent organic damage, are usually improved *(19)*. This points to the greater role which functional factors play in the cause of thyrotoxic heart disease *(31, 46)* and also emphasizes the importance of correct diagnosis and treatment for this condition.

Figure 4 contrasts combined "toxic" and mechanical goiter heart in a young rabbit with the heart and thyroid of a normal rabbit. The diseased rabbit, (no. 1 in table 1), a Belgian female aged 6½ months, spontaneously developed a palpable simple goiter at least 3 months before death, on a stock goitrogenic diet of alfalfa hay and oats of low iodine content. Twenty days before death the thyroid was examined under ether anesthesia and the right lobe was removed. The blood vessels to the thyroid were found to be greatly dilated and the superior thyroid arteries were pulsating. The gland itself was greatly enlarged and markedly hyperemic. The resected right lobe weighed 2.92 grams and the whole gland was estimated to weigh about 6 grams. (The average weight of the normal thyroid in a rabbit is 0.2 gram.) The enlarged

(42) Weiss, S. (Boston), and Wilkins, R. W.: Nature of cardiovascular disturbances in vitamin deficiency states. Tr. A. Am. Physicians 51: 341-373, 1936.

(43) Schultz, M. P.: Induction of carditis by combined effects of hyperthyroidism and infection. Pub. Health Rep. 54: 1205-1228, July 7, 1939.

(44) Likoff, W. B., and Levine, S. A.: Thyrotoxicosis as sole cause of heart failure. Am. J. M. Sc. 206: 425-434, Oct. 1943.

(45) Goodpasture, E. W.: Influence of thyroid products on production of myocardial necrosis. J. Exper. Med. 34: 407-423, Oct. 1921.

(46) Lerman, J., and Means, J. H.: Cardiovascular symptomatology in exophthalmic goiter. Am. Heart J. 8: 55-65, Oct. 1932.

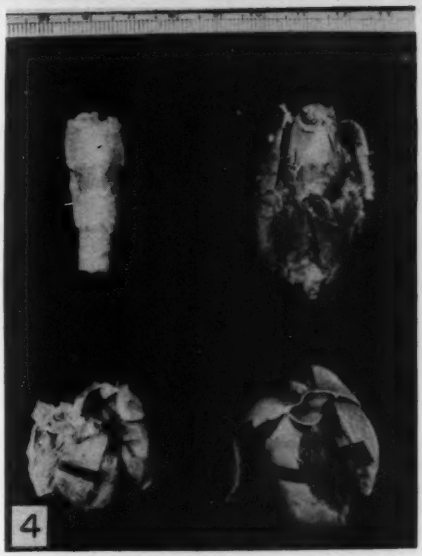


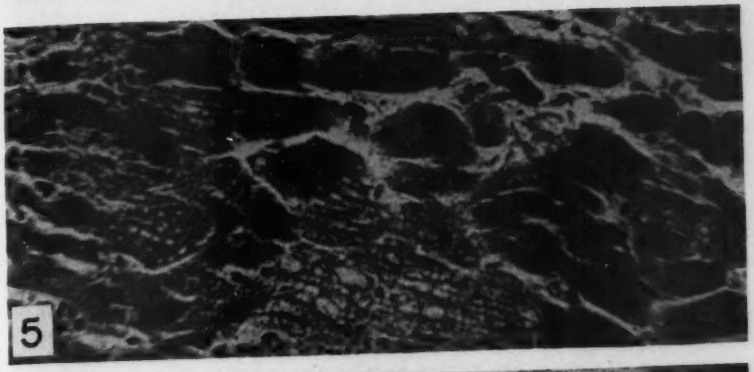
Figure 3. Right: *Mechanical goiter heart in adult chicken.* Left: *Normal heart and thyroid gland (2 lobes) of adult chicken.* *Figure 4.* Right: *Goiter heart ("toxic" and mechanical) in young rabbit.* Left: *Normal heart and thyroid of rabbit of about the same age and body weight as the goitrous rabbit before iodine treatment.*

971621 O - 51 - 2

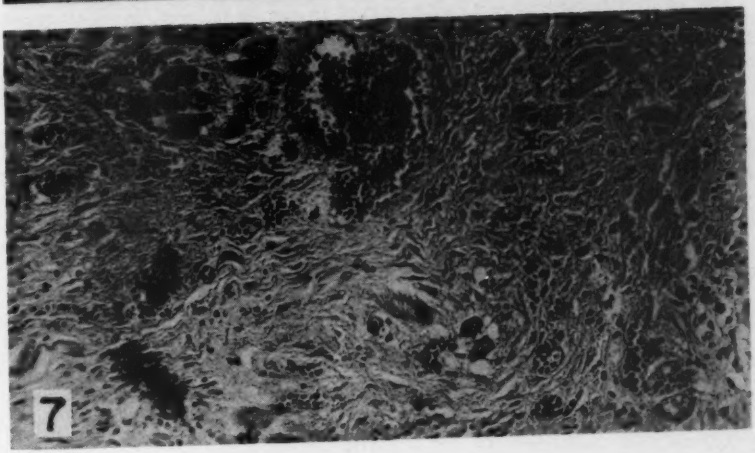
thyroid shown in figure 4 is from another rabbit with the same simple hyperplastic type of goiter and weighed 6.2 grams. Microscopically, the resected lobe showed marked hyperplasia of the follicles and marked dilatation of the blood vessels. Beginning 14 days before death the rabbit received 22 mg. of potassium iodide by intraperitoneal injection in divided doses over a period of 8 days. It promptly developed severe hyperthyroidism as manifested by restlessness, diarrhea, tachypnea, forceful heart action, and later, loss of appetite, marked weakness, and emaciation. Rectal temperature on one occasion was 104.6° F. (normal is about 102° F.). The course was rapidly downhill to death only 14 days after the first injection of KI. The rabbit had lost 713 grams or a little less than one-third of its body weight in this time. The response of the rabbit with a simple hyperplastic goiter to the administration of iodine is to produce an excess of thyroid hormone with resultant hyperthyroidism. This is analagous to the condition termed iodine Basedow's disease in human beings, in whom it is a rare occurrence.

At autopsy, the remaining left lobe of the thyroid seemed somewhat reduced in size from its state at the time of surgical inspection before iodine medication. It weighed 1.09 grams (the hyperplastic right lobe had weighed 2.92 grams), and showed the typical translucent pale-amber, gross appearance and the colloid microscopic appearance of iodine involution. The heart was rather markedly enlarged weighing 9.1 grams (average weight of heart for a rabbit of this size is from 4 to 5 grams). There was hypertrophy and dilatation of both left and right sides. Microscopically, (1) hypertrophy of the muscle fibers of the ventricles, (2) focal fatty degeneration and necrosis of muscle fibers, and (3) many areas of replacement fibrosis, some early with loose fibrillar connective tissue containing a few small round cells, occasional eosinophils and neutrophils, and few degenerated or necrotic muscle fibers and some older with denser connective tissue were seen (figs. 5, 6, and 7). These myocardial lesions appeared to be recent and were considered due to the induced severe hyperthyroidism. The enlargement of the heart, was in part caused by the hyperplastic goiter, and to a certain degree antedated the hyperthyroidism. There was definite evidence of congestive heart failure which appeared to be the major cause of death. Excess fluid was present in the pleural, pericardial, and peritoneal cavities. The lungs

Figure 5. Section of left ventricle of goiter heart shown in figure 4 (right). Note hypertrophy and focal vacuolar (fatty) degeneration of muscle fibers. (Hematoxylin-eosin stain; X 220.) Figure 6. Section of left ventricle of goiter heart shown in figure 4 (right). Note small area of early myocardial replacement fibrosis, few remaining degenerated or necrotic muscle fibers, condensation of loose stroma with beginning proliferation of connective tissue, and few infiltrating small round cells. (Hematoxylin-eosin stain; X 220.) Figure 7. Section of left ventricle of goiter heart shown in figure 4 (right). Note large area of older myocardial replacement fibrosis with denser, more adult but still quite cellular connective tissue containing many engorged capillaries and few small round cells. (Hematoxylin-eosin stain; X 100.)


5

6


7

were congested and edematous. The liver grossly was nutmeg in appearance and on microscopic examination showed congestion and pressure necrosis of the centers of the lobules.

In *animals*, as illustrated in rabbits 1, 2, and 3 (table 1), the experimental production of hyperthyroidism causes more definite organic heart changes than in human beings, but here, also, there is a singular lack of uniformity in reporting results (43, 47). The changes noted are (1) hypertrophy and dilatation of the heart, (2) foci of degeneration and necrosis of muscle fibers, (3) replacement fibrosis, and (4) an infiltration of small round cells with occasional polymorphonuclear leukocytes and eosinophils. Congestive heart failure which is attributable to the hyperthyroidism, may result (rabbit 1, figure 4). For this to occur severe hyperthyroidism must be produced. It is not sufficient merely to elevate the B.M.R. (48). It is possibly this difference in the degree of hyperthyroidism which partly accounts for the difference in the effect on the heart of man with Graves' disease and an animal with experimental hyperthyroidism. The increase in weight of the heart of the goitrous rabbits made hyperthyroid with iodine (table 1, rabbits 1, 2, and 3) was greater than that produced in our laboratory in thyroidectomized rabbits made hyperthyroid with desiccated thyroid (48). This suggests that, even in hyperthyroidism associated with a hyperplastic goiter, the mechanical factor of vascular shunt through the thyroid gland plays a part in the hypertrophy of the heart. In Graves' disease, also, the two factors, mechanical and "toxic", probably operate (17). Both factors produce an increased venous return, the first through a vascular thyroid shunt as described above, and the second through dilatation of small vessels with establishment of peripheral arteriovenous shunts (37). As indicated above, hyperthyroidism acts in other ways also.

Even in patients with long-standing uncomplicated Graves' disease little or no demonstrable change occurs in the heart, yet, in most cases of Graves' disease with enlarged thyroids some enlargement of the heart is probably present even though it may not be demonstrable by the usual means and may be of no clinical significance. That this hypertrophy is relatively slight, although the work load of the heart is greatly increased, is to be partly attributed to the serious interference with the nutrition of the heart muscle. The nutrition of the myocardium is a limiting factor in cardiac hypertrophy. It has been suggested, also, that the relatively insignificant hypertrophy of the heart in Graves' disease may be attributable to a normal stroke output although the minute output is increased (37). The muscle fibers are of normal diastolic length and the fundamental stimulus to hypertrophy, is absent.

(47) Rake, G., and McEachern, D.: Experimental hyperthyroidism and its effect upon myocardium in guinea pigs and rabbits. J. Exper. Med. 54: 23-30, July 1931.

(48) Gross, H., and Greenberg, S. S.: Effect of thyroid extract, adrenalin, and combination of these on hearts of intact and thyroidectomized rabbits. Am. Heart J. 27: 186-202, Feb. 1944.

CONCLUSIONS

Thyrotoxic heart disease is not a distinctive type of heart disease. The toxic goiter heart is a heart which generally shows little or no structural alteration beyond slight enlargement, but which, nevertheless, has serious impairment of its functional capacity. Hyperthyroidism increases the work of the heart while it impairs the nutrition. The heart can withstand this unfavorable situation for a surprisingly long time, but if compensated cardiac damage due to hypertension, arteriosclerosis, syphilis, rheumatic fever, or senescence, is present, the impaired functional capacity may contribute or precipitate clinical thyrotoxic heart disease. The occasional occurrence in Graves' disease of cardiac insufficiency without organic heart disease is explained by (1) deficient nutrition of the myocardium, (2) increased work of the heart, and (3) increased vulnerability of the heart to even mild intoxications and infections. The occasional occurrence of myocardial lesions presumed to be due to hyperthyroidism, in the absence of other heart disease can be explained in the same manner. There is no evidence for a cardiotoxic principle to explain the cardiac disturbances in Graves' disease.

BOOK REVIEW

Frontal Lobotomy and Affective Behavior, A Neurophysiological Analysis, by *John F. Fulton,* M. D., Sterling Professor of Physiology, Yale University. 159 pages; illustrated. W. W. Norton & Co., Inc., New York, N. Y., publisher, 1951. Price $3.

For the Salmon Memorial Lectures herein published, Dr. Fulton selected the "general theme of human and primate behavior as affected by specific lesions of the forebrain, particularly the frontotemporal complex." Previously the same author had summarized earlier work in this field up to 1948 and in this publication endeavors to review work carried out since that time. There is a section on historical background, then a discussion of recent material on the functional anatomy of the fronto-cingulo-temporal cortex. The third of this book's four chapters deals with behavioral studies in monkeys, baboons, and chimpanzees. The concluding chapter deals with frontal lobotomy in relation to human behavior. The author notes two developments within the past 3 years. (1) "The use of a more restricted operation and (2) adaptation of the operation to the nature of the mental illness."

—*Col. J. W. Kemble, MC, U. S. A.*

ARTICLES BY PERSONNEL OF THE MEDICAL SERVICES OF THE ARMED FORCES PUBLISHED IN OTHER JOURNALS

Burch, R. J., Lt. Col. U. S. A. F. (DC): Treatment of displaced fractures of edentulous mandibular angle. Oral Surg., Oral Med. & Oral Path. 9: 1101-1107, Sept. 1951.

Leffler, R. J., Lt., MC, U. S. N.: Renal agenesis. Am. J. Clin. Path. 21: 752-757, Aug. 1951.

Levene, G., and Kaufman, S. A., First Lt., U. S. A. F. R. (MC): Roentgen diagnosis of pericardial effusion, with special reference to appearance of barium-filled esophagus and cardiohepatic angle. Radiology 57: 373-383, Sept. 1951.

Roth, L. H., Lt. (jg), DC, U. S. N. R.: Observations and significance of side reactions during treatment of oral conditions with oral aureomycin. West Virginia Dent. J. 25: 123, Apr. 1951.

Roth, L. H., Lt. (jg), DC, U. S. N. R.: Table of suggested therapy with aureomycin hydrochloride, crystalline, in dentistry. Pennsylvania Dent. J. 18: 100-102, Apr. 1951.

Wilson, W. L., Col , MC, U. S. A.: "Less than his best." Prison World July-Aug. 1951.

Zehrer, F. A., Lt. Col., MSC, U. S. A.: Investigation of Rorschach factors in children who have convulsive disorders and in those who present problems of adjustment. Am. J. Orthopsychiat. 21: 292-302, Apr. 1951.

Treatment of Nerve-Gas Casualties[1]

John R. Wood, *Colonel, MC, U. S. A.*
Paul F. Dickens, Jr., *Commander, MC, U. S. N.*
John Rizzolo, *Major, U. S. A. F. (MC)*
Milward W. Bayliss, *Colonel, MC, U. S. A.*

THE nerve gases are a group of highly toxic chemical agents having a physiologic action like, but much more prolonged than, physostigmine. They are readily absorbed through the respiratory tract, the skin, the eyes, and the gastrointestinal tract. Symptoms induced by incapacitating or lethal doses begin immediately and progress at a rapid rate.

Casualties contaminated with liquid nerve gases endanger unprotected personnel. Handlers of such patients should wear protective rubber aprons and gloves so long as there is any chance of skin or clothing contact with the liquid agent. Liquid nerve gases slowly penetrate even heavy rubber aprons and gloves; hence any liquid agent observed on the aprons or gloves should be washed off as soon as practicable and they should be changed for uncontaminated aprons and gloves after several hours of continuous use. A gas mask is essential, as nerve-gas vapors from such casualties will quickly incapacitate attendants.

Neither personnel nor equipment contaminated with liquid nerve gas should be brought into a hospital or an enclosed space until the liquid nerve gas has been completely eliminated. The nerve gases are soluble in water and may be removed by flooding with water in a shower. The clothing from such a casualty should be removed promptly and left outdoors along with such contaminated items as blankets, litters, and equipment. Ambulances and other equipment used for transporting casualties contaminated with persistent liquid nerve gas must be decontaminated.

The gas mask protects the eyes, respiratory tract, and mouth from nerve gases in either vapor or spray form. Ordinary clothing or impregnated permeable protective clothing afford little protection to the

[1] Chemical Corps Medical Laboratories, Army Chemical Center, Md.

body against liquid nerve gas. Impermeable protective clothing and individual protective covers give better protection.

The nerve gases can poison food and water and the persistent types can render other supplies dangerous to handle.

TOXICITY

The nerve gases are much more toxic by inhalation than other standard casualty-producing chemical agents. Their lethality by liquid contamination of the eye or skin shows an even greater margin of danger, and they are much more toxic by ingestion in food and water than other standard chemical agents. Exposure of unprotected men for a few minutes to barely recognizable concentrations of vapor will produce harassing symptoms, with consequent loss of efficiency for several days. Slightly greater exposure will produce severe harrassment or mild incapacitation lasting a week or more. More severe, but nonlethal, poisoning may require hospitalization for 3 weeks or longer. The absorption of nerve-gas vapors through the skin, in a single exposure to ordinary field concentrations, is not expected significantly to affect properly masked men. Deaths among properly masked men from vapor exposures probably will not occur, but the nerve gases are cumulative poisons and repeated exposures to extremely low concentration at intervals of 24 hours or less may cause the development of symptoms. Liquid nerve gas on the skin or clothing, and especially in the eye, is extremely dangerous.

PHARMACOLOGY

The nerve gases, like the newer insecticides parathion, tetraethylpyrophosphate, and hexaethyltetraphosphate, exert their effects by depressing the cholinesterase activity of the tissues below a functional threshold. The outstanding manifestations of acute poisoning by these agents resemble those produced by excessive stimulation of the parasympathetic nervous system, the central nervous system, and somatic motor nerves. Therefore, these substances should be classified as cholinergic agents.

The nerve gases are readily absorbed from the skin, mucous membranes, respiratory tract, and the gastrointestinal tract. The signs and symptoms of poisoning by these agents include muscarine-like, nicotine-like, and central nervous system effects. Important factors in determining the severity of the symptoms and rapidity with which they appear are the route of absorption, the concentration, and the duration of the exposure. These signs and symptoms include anorexia, nausea, vomiting, abdominal cramps, tenesmus, and diarrhea. There is increased sweating, lacrimation, and tightness of the chest with prolonged wheezing expiration suggestive of bronchoconstriction. The pupils become constricted and occasionally show inequality of size. There is increased fatigability associated with muscular weakness and twitching.

The central nervous system effects include giddiness, insomnia, tension, anxiety, depression, and changes in the electroencephalogram (EEG). With the appearance of the mildest symptoms a slight but definite diminution in the voltage of the EEG can be noted. When moderate symptoms are present the EEG may show irregularities in rhythm, variation in potential, and intermittent bursts of slow waves similar to those seen in tracings from patients with epilepsy. Involuntary defecation, urination, pulmonary edema with cyanosis, and convulsions occur with a large dose of the nerve gas. The muscarine-like effects, and, to a lesser extent, the central effects are inhibited by atropine. The tolerance for atropine is greatly increased in subjects poisoned by the nerve gases.

There is a fairly narrow margin between the dose of the nerve gas that produces systemic symptoms and the dose that would probably be lethal. Following exposure to these agents there is increased susceptibility to their effects for 24 hours after the disappearance of symptoms and the electroencephalographic changes may persist for days. Repeated exposures may produce cumulative effects. This is apparently a function of the dose of the nerve gas and the rate of restoration of the cholinesterase in the tissues.

The manner in which the body detoxifies and excretes the nerve gases is not definitely known. Such factors as the rate of inhibition of cholinesterase, the reversibility of the inhibition, the rate of restoration of cholinesterase in the various tissues and the rate of removal of the anticholinesterase compounds from the body appear to be important in the toxicity of these substances.

SYMPTOMS

The symptoms described are based on animal experiments and on accidental human exposures to other anticholinesterase agents such as parathion which have similar effects.

Effects of vapor. Vapor of an anticholinesterase agent acts directly on the smooth muscles of the eye and respiratory tract, producing miosis and ciliary spasm in the eye and bronchoconstriction. It is rapidly absorbed in the respiratory tract and carried by the circulation to other smooth muscles and to the nervous system where it causes widespread systemic effects. Minimal exposure for a few minutes to trace concentrations will cause marked pupillary constriction, lasting 1 to 3 days. The only symptom likely to be noted by the subject is some difficulty in seeing in dim or artificial light. Some persons will have a mild intermittent bronchoconstriction, causing recurrent periods of a sensation of tightness in the chest, lasting usually only a few hours. Some will also have a moderate watery nasal discharge lasting about 12 to 24 hours.

Increasing this minimal exposure will cause intermittent bronchoconstriction, coming on very quickly in most subjects and lasting from

1 to several days. The sense of tightness in the chest and difficulty in breathing are harassing but do not cause hypoxemia. With this degree of exposure all subjects will exhibit extreme miosis, lasting several days, and will have ciliary spasm with attendant pain in the eyes, radiating as headache either frontally or to the occiput, and some difficulty of accommodation. Moderate photophobia is usually present, and focusing the eyes on near objects is a painful experience. Rhinorrhea, lasting several days, is a minor complaint. These patients suffer loss of efficiency but are not incapacitated.

A further increase produces such aggravation of the above symptoms that extreme harrassment or borderline incapacity result. Under great military necessity most of these subjects *could* continue combat duties at reduced efficiency, but many would probably be treated as mild casualties under less pressing circumstances.

At larger doses the zone of true casualty production is reached. Bronchoconstriction, though intermittent and not complete, is so continuous and breathing so difficult that the victim is unable to carry on his duties. Mild hypoxemia may be present during bronchospasm and the subject may be confused, panicky, and fearful of suffocation. Rhinorrhea, beginning bronchorrhea and slight cough, extreme miosis, ciliary spasm, pain of accommodation, headache, and photophobia add to his misery.

With large doses, all unprotected men will be casualties, many with alarming symptoms. This is still a small exposure by comparison with casualty-producing doses of other standard chemical agents, and doses of the vapor exceeding this will almost certainly be met in any modern chemical attack. At this dosage the airway may be almost completely closed by bronchoconstriction and laryngeal spasm, complicated by bronchorrhea. Up to this point the subject's muscular effort at respiration is powerful, but very little ventilation of the lungs is accomplished. As his anoxemia increases, he becomes more confused and may fall exhausted and unconscious. His muscles of respiration, now fatigued and weakened, gradually lessen their efforts. The heart rate, accelerated at first, now weakens and slows, and the blood pressure falls. The airway, tightly constricted until now, relaxes slightly. Muscular tremors develop, followed by fibrillary twitching and often by occasional clonicotonic convulsions, caused by the combined effects of anoxia and the direct action of the nerve gas on the central nervous system. Paralysis of respiration is usually not complete at this dosage and the subject retains enough muscular function to ventilate his lungs through his gradually relaxing airway and thus survives the anoxia.

Meanwhile, he suffers many of the classical symptoms of muscarine poisoning: salivation, rhinorrhea, excessive glandular secretions into the intestine with hypermotility, nausea, vomiting, abdominal

cramps, watery diarrhea, and possibly incontinence of urine and feces. Miosis, ciliary spasm, photophobia, and headache are severe. At several times the severe casualty dose, the lethal range is reached. The clinical findings in the fatal case are similar to those in the severe casualty, but increased in tempo and severity. The initial blocking of the airway is virtually complete and extreme anoxia, collapse, and unconsciousness come on more quickly. On collapse, the paralysis of respiration is complete and despite relaxation of the airway spontaneous respiration is impossible. Clonicotonic convulsions are a prominent terminal feature and is followed by generalized flaccid paralysis. The bradycardia is extreme, often resulting in a sudden and complete arrest of heart action, which may be either a temporary or a terminal event. Massive salivation and incontinence of urine and feces are the rule.

Effects of liquid. Liquid anticholinesterase agents are absorbed rapidly from the eye and mucosa of the nose or mouth by which routes they are extremely toxic. The time element, from contamination of these areas to the initial development of systemic symptoms, is 1 or 2 minutes, and death follows rapidly in fatal cases. Absorption through the skin, from direct skin contamination or from liquid contamination of the clothing, is a somewhat slower process, and larger doses are required to produce the same degree of poisoning. The time from contamination to initial systemic symptoms is, however, still relatively short—from 5 to 20 minutes, depending on the type of agent, the magnitude and anatomic location of the contamination, and the physical condition of the skin. Usually, the first sign to appear following skin contamination is localized muscular twitching at the site of contamination. This is soon followed by bronchoconstriction and salivation, then mental confusion and excitement, then generalized clonicotonic convulsions. If the eyes have been protected from direct access of the liquid agent and its vapor, miosis does not appear until the poisoning is well advanced. The clinical course of the poisoning is otherwise much the same as that caused by the inhalation of nerve-gas vapor.

Psychophysiologic effects. The survivors of anticholinesterase poisoning may exhibit mental effects for several days following exposure. In patients with mild exposure there may be giddiness, tension, anxiety, jitteriness, insomnia, and excessive dreaming. With more severe exposure there may be withdrawal, depression, restlessness, tremor, emotional lability, and irrational behavior. The EEG may show intermittent burst of slow waves (from 4 to 6 per second) of normal to elevated voltage, especially following hyperventilation. Military commanders and medical officers must give serious consideration to the possibility of panic among combat personnel in nerve-gas attacks and take all possible steps to prevent or control it.

DIAGNOSIS

The diagnosis is made from the symptoms. Unprotected personnel exposed to vapor or aerosol first experience a running nose, a sense of tightness in the chest, and exhibit miosis. Masked men, poisoned by the absorption of an anticholinesterase agent from liquid contaminations of the skin or clothing, first experience local muscular fasciculations, followed by bronchoconstriction. Ingestion of contaminated food or water first induce salivation, nausea, and abdominal cramps, which may be followed by vomiting and diarrhea. Marked salivation, bradycardia, hypotension, bronchoconstriction with cyanosis, muscular twitching, and convulsions are diagnostic signs of importance in the more severe cases.

FIRST AID AND EMERGENCY TREATMENT

Severely wounded men or persons severely poisoned with an anticholinesterase agent may be incapacitated and incapable of administering self-aid. Such patients must have help from aid men, or other available personnel, in adjusting gas masks, in decontamination, and in the administration of atropine. Liquid contaminations on the skin must be removed immediately by flooding with water or by swabbing the contaminated skin with cotton or cloth pledgets which are well wetted with a suitable fluid. Alkaline fluids are much more effective than plain water. Any of the following fluids is satisfactory: (1) a slurry of 1 part of bleach in 3 parts of water by volume, (2) a 5 to 10 percent solution of sodium carbonate, (3) a 5 to 10 percent solution of ammonium hydroxide, or (4) a 2 percent solution of sodium hydroxide. If none of these is available, wash the contaminated skin with soap and water after flushing with water. Clothing and equipment contaminated with liquid nerve gas must be removed from casualties as quickly as possible and the casualty moved out of the contaminated area.

Injections of 2 mg. of atropine sulfate by nonprofessional personnel may be given at 3-minute intervals, if necessary, up to a total of 6 mg. If the patient has convulsions but is not cyanotic when found, the 6 mg. of atropine must be given promptly in *one* injection.

If respiration has ceased there is no hope of survival, unless an effective method of resuscitation can be instituted immediately. Because the nerve gases produce a peripheral flaccid paralysis of the muscles of respiration, the chest is collapsed and there is little expiratory reserve. Because of this paralysis there is no elastic recoil when the chest is compressed and released. Effective methods of artificial respiration, such as the Holger-Nielsen method or the hip-lift prone-pressure method as devised by Emerson, Ivy, and others, assist both inspiration and expiration.

If in a contaminated area, the victim's mask should be kept on and properly adjusted before artificial respiration is started. In the Holger-Nielsen method the patient is placed in a prone position, face to one

side, neck hyperextended, with the hands under the head. The operator kneels at the patient's head, grasps the arms near the elbows, and pulls the elbows upward and forward toward the head, expanding the chest and causing active inspiration. He then releases the patient's arms, causing passive expiration. He then places his hands on the patient's back near the lower borders of the scapulas and exerts pressure on the chest, resulting in active expiration. The pressure is then released causing active inspiration. This cycle should be repeated from 10 to 12 times a minute.

In the Schafer-Emerson-Ivy (hip-lift prone-pressure) method the mask is adjusted as before if in a contaminated area and the victim is placed in a prone position with his hands under his head and the neck hyperextended. The operator kneels over the patient, straddling his thighs. The thighs are grasped just below the hip joints at the pubis and the hips are lifted from 10 to 12 inches and then lowered to the ground. This procedure is alternated with the Schafer maneuver. Such a cycle is repeated from 10 to 12 times a minute.

A resuscitator which supplies air drawn from the atmosphere cannot be used in the contaminated area. A necessary modification is the inclusion of a gas-mask canister in the air-intake channel. Portable, bellows-type resuscitators, so modified, can be used for this purpose, but the weight of such items (about 5 pounds each) precludes the possibility that more than a few of them can actually be transported to and used on casualties during combat.

TREATMENT

The treatment of anticholinesterase poisoning is based on blocking the effects of accumulated acetylcholine by giving atropine and on appropriate symptomatic therapy. In patients with mild exposure the intermittent bronchospasm is readily relieved with small doses of atropine.

Patients with moderately severe exposure suffering from bronchospasm, dyspnea, cyanosis, bradycardia, and hypotension should be given 2 mg. of atropine (intravenously if possible, otherwise intramuscularly) every 2 to 3 minutes until these symptoms are relieved and such signs of atropinization as dryness of the mouth appear. It is amazing how much atropine some of these patients tolerate without showing any signs of atropinization. Smaller parenteral or oral doses of atropine must be administered every few hours thereafter for at least several days to maintain atropinization because the poisoning is far more persistent than the atropine effects. Some of these patients will show muscular twitching or clonicotonic convulsions. The convulsions, if not adequately controlled by atropine, may be controlled by the intravenous or intramuscular injection of 1 gram of trimethadione in a 20 percent solution every 15 minutes up to a maximum of 5 grams. This drug has the advantage of not depressing respiration. Such barbi-

turates as phenobarbital sodium and thiopental sodium may also be used for the control of convulsions, but they have the disadvantage of depressing respiration. Apprehension, in a patient not receiving a barbiturate for the control of convulsions, may be allayed by 0.1 gram of pentobarbital sodium by mouth, repeated in 30 min., and then every 6 hr., if necessary. Smoking must be avoided in the early stages of treatment because it aggravates the respiratory and gastrointestinal symptoms of nerve-gas poisoning.

Patients with severe exposure suffering from profound anoxia and intermittent, almost continuous convulsions, followed by a flaccid paralysis, present a very grave and difficult problem. Atropine is dangerous for patients with severe and prolonged anoxia. The sudden release of the heart from vagal control, with the attendant increase in work by the heart muscle, in the face of severe and prolonged anoxia, may lead immediately to ventricular fibrillation and death. The administration of atropine should be delayed in this condition until the lungs have been ventilated and the heart has made some recovery from anoxia. Because the chest is collapsed by flaccid paralysis of the muscles of respiration, a positive pressure method of resuscitation must be used to ventilate the lungs. Any available type of powered respirator (e. g., "iron lung") is also satisfactory for this purpose. Resuscitation may be needed for an hour or more before spontaneous respiration is restored. As soon as the anoxia is overcome, atropine should be given intravenously or intramuscularly in full dosage until signs of atropinization appear. Maintainance doses of atropine must be given orally or parenterally for several days thereafter because the effects of nerve-gas poisoning are much more persistent than atropine effects. Convulsions are controlled as described above.

Systemically administered atropine does not relieve the ocular effects of nerve gases. An ophthalmic ointment of 2 percent homatropine hydrobromide for mild exposure, or of 1 percent atropine sulfate for severe exposure, is necessary until good mydriasis is obtained. This usually relieves miosis, eye pain, and headache promptly, but the procedure may have to be repeated several times as the miosis frequently recurs.

The dosage of atropine recommended (2 mg.) is about 4 times the usually accepted dose. Care should be taken to avoid atropine poisoning, especially in the milder forms of nerve-gas poisoning.

SUMMARY OF FIRST AID AND TREATMENT

Life-saving measures.

1. Termination of exposure; masking casualty; removing from contaminated area; decontaminating skin surfaces exposed to contamination by removal of contaminated clothing and equipment.

2. Atropine administration—given as soon as possible after poisoning and repeated as necessary.

3. Artificial respiration—in paralyzed casualties, if practicable.

Symptomatic treatment.

1. Anticonvulsive drugs—trimethadione or thiopental sodium to control convulsions not controlled by atropine.

2. Sedative drugs—pentobarbital sodium to allay apprehension.

3. Mydriatics—atropine or homatropine to overcome miosis.

BOOK REVIEW

The 1950 Year Book of Physical Medicine and Rehabilitation (December 1949-January 1951), edited by *Frank H. Krusen,* M. D., Professor of Physical Medicine, Mayo Foundation; Head of the Section on Physical Medicine and Rehabilitation, Mayo Clinic; Associate Editors: *Earl C. Elkins,* M. D., Assistant Professor of Physical Medicine, Mayo Foundation; Consultant in Physical Medicine and Rehabilitation, Mayo Clinic, and *George G. Deaver,* M. D., Professor of Clinical Rehabilitation and Physical Medicine, New York University College of Medicine; Director of the Department of Physical Medicine and Rehabilitation, Bellevue Hospital. 328 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., publisher, 1951. Price $5.

This book should be in the library of every physiatrist, physical therapist, and occupational therapist. In this small volume the editors have compiled in abstract form the best of the 1950 literature concerning physical medicine and rehabilitation. The foreign as well as the domestic literature has been included in this book. There are many footnotes written by the editors. These contain pertinent comments by the experts evaluating the relative merits of procedures reported. Thus readers can get some help in determining which of the articles make a real contribution to this specialty. Of special interest is the section on "Physiologic Considerations." The work being done in basic neuromuscular physiology is most interesting. Great advances in technics, based on these studies, can be expected within the next few years.—*Lt. Col. J. N. Schaeffer, U. S. A. F. (MC)*

BOOK REVIEW

The Architecture of Normal and Malformed Hearts, A Phylogenetic Theory of Their Development, by *Dr. Alexander Spitzer,* Late Professor of Anatomy, The University of Vienna, With a Summary and Analysis of the Theory, by *Maurice Lev,* B. S., M. D., Associate Professor of Pathology, University of Illinois Hospitals, Chicago, Ill., and *Aloysius Vass,* M. D., with a Foreword by *Otto Saphir,* M. D., Pathologist, Michael Reese Hospital, Clinical Professor of Pathology, University of Illinois College of Medicine, Chicago, Ill. 145 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1951.

This translation of Spitzer's monograph is an important contribution to the study of congenital heart disease. Spitzer's outstanding contribution is in the embryologic basis of congenital heart disease. It is surprising that the work of translation was not accomplished long before this for the nonreaders of German. One can realize the difficulties which the translators encountered for sometimes sentences appear very complicated, and must be reread to be understood. Spitzer suggested a phylogenetic rather than an ontogenetic explanation of the development of the malformed heart. His views are ably and exhaustively supported. This book is an extension of his original idea concerning the development of the normal mammalian heart. The basic assumptions that he develops are: (1) that the mammalian heart evolved from lower vertebral forms; (2) that this evolution is a purposeful adaptation on the part of animal life; (3) that in phylogeny hydrodynamic factors play a role in the development of the circulation, the basic factor being a progressive increase in blood volume and pressure; and, (4) that in ontogeny phylogenetic forces are inherited in a biologically organized form. He relates to this the changes in respiration as the governing factor of the circulatory changes.

The translators have prepared their own summary and analysis of Spitzer's theory, and the reader may find the book easier to understand if he begins with this part, and later reads the first portion which is the translation of Spitzer's writings. The translators' criticism of Spitzer's theory is that it fails to explain the absorption of the bulbus arteriosus and all of the transposition that occurs. The translators have modified the theory so that it will explain the development of the malformed heart. Their failure to include Spitzer's special description of separate instances of malformations is a serious omission. They thereby lost the opportunity to produce a complete translation.

This book will delight the embryologist, the anatomist, and all those interested in the problem of congenital heart disease.

—*Commander H. A. Lyons, MC, U. S. N.*

Evolution of Medical Air Transport Policies

Joseph A. Baird, *Colonel, U. S. A. F. (MC)* (1)

THE transportation of sick and wounded by air is now an everyday occurrence, familiar to all, and generally acceptable both in theory and in practice. Where speed, safety, and comfort are desired, air transportation is the method of choice. This very commonplaceness, this ready human adaptation to the newest form of personal communication tends to make us overlook not only its implications for the future, and its impact on the present, but also its evolution from the past. Just as commercial air travel has not always been the method of choice, so with medical air transport. The history and development of the latter parallel that of the former and both have depended on the growth of the airplane from a primitive craft, for military uses only, to one of manifold uses and designs.

In its early days the airplane was built primarily for speed. Comfort and safety were lesser considerations. The selection of a patient for transportation by air was made with the thought in mind that air travel was a calculated risk to be undertaken only because the patient had otherwise a small chance to survive. Air transport was the lesser of two evils. There was little knowledge of the effects of air travel on clinical conditions. The ambulatory patient was placed in an open cockpit, exposed to noise, wind blast, and temperature extremes. The bed patient was either propped up in a similar situation or the aircraft hastily modified to make room for a litter.

Economy of time was assured from the beginning of medical air evacuation but research and development continued endlessly to attain greater speed and a wider range of operation, and at the same time to increase the safety of the operation. Military aircraft were built primarily for fast, mobile firepower. This resulted in the sacrifice of safety When the goal of safety was finally reached it was a composite result of design, construction, operation, meteorology, and communications. With safety came increased use of aircraft for passenger travel and, consequently, patient travel. It became possible to transport both litter

(1) Headquarters, Continental Division, MATS, Kelly Air Force Base, Tex.

971621 O - 51 - 3

and ambulatory patients over long distances speedily and safely. These conditions were achieved late in World War II and continued to exist as prime requisites for air evacuation until about 1949. Then for the first time it became possible to ask for and receive additional comfort features in aircraft.

I am not implying that these comfort items had not been previously envisioned by workers in the medical air evacuation field. Pilots and ground personnel, nurses, stewards, medical technicians, traffic managers, and doctors had all dreamed and struggled to improve the patient evacuation service. They were impeded by many things such as narrowness of concept and thought, limitations on funds and personnel, lack of priority, support, and a defined mission.

When in 1948 Military Air Transport Service (MATS) was organized and began a planned air evacuation system for the Military Establishment, there was some liberalization of concept, increased intraorganizational command support, and a definite mission; but funds and personnel were still lacking. The formation of policy was difficult and slow because no one was quite sure just what kind of a policy was needed or wanted. MATS was organized as the primary agency for air travel of patients, but rail, ship, ambulance, or other means of transport were to be used if the shipping agency favored those means. Within the Air Force itself there was a casual attitude toward air evacuation. It was something to be used if time permitted and aircraft were available, but whenever another mission involved the aircraft concerned they were diverted from air evacuation and the patients were moved by other means. This lack of reliability was the chief objection to the medical use of air transportation.

In 1949, acting on the recommendation of the Surgeons General of the Army, Navy, and Air Force, it was finally decided that the primary method of choice for transporting patients, worldwide, would be air and that MATS would be the transport agency. This indicated sufficient means, Department of Defense support, high priority, and a well-defined mission, and that a definite policy could be conceived and published by the responsible agency.

Although Headquarters, U. S. Air Force retained the policy-making prerogative, by regulation most of it was delegated to the Commander. MATS. Within the limits of the mission defined in broad general terms by the Department of Defense, and the more specific but still rather general limitations of policy, personnel, equipment, and funds laid down by Headquarters, USAF, the Commander of MATS, as represented by his Air Surgeon, is responsible for prescribing the detailed policies for Air evacuation.To help him accomplish this, the Air Surgeon, MATS, has his regular staff plus a Navy medical officer who is his deputy. This officer aids in the formulation of policies, especially those relating to the employment of equipment and personnel of the Navy Air Transport Squadrons within MATS.

One of the missions of MATS is the movement of all patients by air for the Department of Defense with speed, safety, and comfort. Specifically it is restricted to transportation and medical care aboard aircraft en route. At the originating or RON (remain-over-night) hospital after the responsible medical officer decides which patients will be moved and what method of travel is desirable, he coordinates with the air evacuation liaison officer and together they decide when the move will be made. The local medical regulating officer or the Armed Services medical regulating office decides each patient's destination.

The air evacuation mission of MATS is, therefore, predominantly a medical service responsibility. Virtually all other staff sections are involved in the success of the mission, operations and traffic more so than others, but the Air Surgeon of MATS is responsible for the general supervision and efficient functioning of all the interested elements and sections. The Air Surgeon thus has an interest in such matters as personnel, public relations, preceptor training, supply, equipment, development, procurement, organization, and plans, including mobilization, war, and disaster plans. In addition to this internal or staff supervision and liaison, the Air Surgeon is charged with external liaison with all using agencies. This includes not only Department of Defense and Veterans Administration hospitals, but also liaison with the Surgeons General of the Army, Navy, and Air Force, with the School of Aviation Medicine, with the Aeromedical Research Laboratory, with the Army Medical Field Service School, and with the surgeons of major military areas and commands. The major policy then is that air evacuation is a medical responsibility.

How are policies developed? The Air Surgeon, MATS, brings together the experience of his colleagues and his predecessors, and studies history. By these means he can develop workable policies. Many others will be evolved from technicians' ideas, and nurses' and pilots' reports of discrepancies or unsatisfactory performance that reach him from the operational level. Still others come from a study of published reports of the Aeromedical Laboratory, and reports on such subjects as the effect of air transportation on clinical conditions, or studies on drugs to prevent airsickness, prepared by the School of Aviation Medicine. After he has received and analyzed these ideas, and found them to be applicable generally, he can make immediate corrections within his own organization, but because MATS is a command on a level subordinate to the Department of the Air Force but doing a job for commands on a level with the AF any changes or corrections in policy will not become effective unless and until they are published in a joint regulation. A typical example of such a joint regulation is AFR 160-52. It is also known to the Army as AR 40-535 and to the Navy as CNO Ltr 20P56.

This regulation had its inception as a MATS regulation which was published in March 1949 but it was only partially effective until its publication as a joint regulation in March 1950. It is a declaration of some

of our policies and it clearly defines the responsibilities of the using agencies and transporting agency. Another joint regulation which, when published, ended a long period of unhappiness for medical supply and property officers is AFR 67-40 (AR 40-538; BUMED Cir Ltr 50-92). It has solved the complicated problem of accounting for blankets, litters, sheets, pillows, and other items accompanying patients. A third joint regulation is AFR 76-15, known also as DA Pamphlet 29-16 and CNO Ltr 98P05. This regulation is primarily intended to define personnel eligible to travel on MATS aircraft. The portion of interest as a matter of policy is paragraph 5a (9) which states that any person may be transported in case of an emergency. In order to complete emergency flights the base commanders may use either aircraft or MATS aircraft.

These three joint regulations have greatly helped solve external problems though there remain many internal ones for which policies are yet to be made. These policies are of primary use to the transport agency and they concern such matters as organizational structure, personnel, training, operations, traffic, plans, including war plans, and actual medical care while in flight.

The formulation of policy and its publication to every member of an organization is fundamental to the success of the mission of that organization. Although patients were transported by air from the earliest days of aircraft, and although air evacuation progressed through those years from daring individual flights to routine flight of thousands of patients across thousands of miles, development of real and useful policy has followed definition of mission, fixing of responsibility, revision of concept, declaration of priority and assurance of complete support.

Medical Experiences in Korea

Donald E. Carle, *Colonel, MC, U. S. A.* (1)

IN this article certain aspects of the Army Medical Service as it functioned in the early period of the Korean campaign are presented. The scope of the subject matter is limited to selected observations, based on my personal experiences while serving as the Second Infantry Division Surgeon.

MEDICAL DOCTRINE

Hostilities in Korea have generated much discussion among officers of the Army Medical Service regarding the validity of the basic medical doctrine now being taught in the various service schools. There are those who insist that the whole structure of current military-medical doctrine should be re-examined with a view to incorporating a number of radical changes on the premise that recent medical service developments in Korea indicate the need for such revision. My personal experiences and observations in this connection have provided no basis whatever for questioning the soundness of medical doctrine as presently taught in the service schools.

In my opinion, those who question the validity of the doctrine misinterpret its intent and purpose. An analysis of many points of objection raised by medical personnel regarding doctrine invariably reveals a type of evaluation which fails to take into account the fact that flexibility is the keynote of the current teaching. The doctrine underlying modern military-medical procedures is not intended to be inflexible. The primary purpose, rather, is to establish certain basic military-medical principles. On such a foundation, medical personnel engaged in rendering field medical service may elaborate, improvise, and adapt whatever medical means is at hand to the specific demands imposed by the local medical situation, terrain and weather factors, and the existing tactical position. In Korea, our unusually long ambulance runs were regarded by some medical officers as bordering on the unorthodox. Moreover, the minor shuffling of transportation equipment between local medical units, in order

(1) Division Surgeon, Second Infantry Division, July 1950-January 1951.

to achieve a more efficient functional arrangement to meet a specific situation, was often regarded with grave misgivings. Changes of this nature do not, in any sense, invalidate basic medical doctrine. They merely represent an extension of the principle of conversion of resources to meet a given set of circumstances.

ORGANIZATION AND EQUIPMENT

The Table of Organization and Equipment (TO/E) for the medical detachment of a divisional headquarters provides for personnel and equipment sufficient *only* for the establishment of one medical installation. It is, however, common policy to establish a forward and a rear division command post and sometimes a third command post, known as "division advance." Because any appreciable intervening distance makes it extremely difficult, if not actually impossible, to render efficient medical service with one functional unit for the two, or three, command post elements, an informal arrangement is usually made to borrow from the medical battalion a medical officer, one enlisted technician, and sufficient equipment, including appropriate types of medical field chests, to allow for the establishment of two functional aid stations. One station is located at the division rear command post and one at the division forward command post.

Although no provision is made in the present TO/E of the medical battalion for the personnel and equipment required to operate a neuropsychiatric treatment center, as such, the flow of neuropsychiatric casualties in one Korean action was so great as to make it virtually mandatory to establish such a divisional center. During the critical days of the Naktong River defense (August and September 1950) replacements for those personnel evacuated rearward of divisional boundaries were almost nonexistent. Therefore a policy was adopted, with the approval of the Surgeon, Eighth Army, to hold all neuropsychiatric cases, who were thought to be salvageable within from 5 to 7 days, at division clearing station level. This is much longer than was envisaged in the accepted teaching doctrine of the divisional medical service. There was, however, from the practical viewpoint, no alternative but to hold them, if the Division's strength was to be conserved. The most rearwardly located divisional clearing station operated, in addition to its normal function, as a neuropsychiatric treatment center, although its TO/E did not provide the necessary augmentation. Also, no army neuropsychiatric treatment centers were available in Korea at that time. In establishing the center it was necessary to secure additional tents and other field equipment. When the need for the center ceased to exist, its personnel were redeployed to various medical sections of the medical battalion.

Another example of deviation from specific TO/E provisions was the occasional employment of dental officers in tasks or missions other than strictly dental professional duties. In like manner, the division

neuropsychiatrist may, at times, also be called on to aid and assist other medical officers in the care of sick and wounded when the neuropsychiatric patient load is small.

The distances normally existing between the division surgeon's headquarters and the medical battalion commander's command post, coupled with the difficulties inherent in combat communications, usually compels the informal borrowing of one officer and one driver from the medical battalion for constant liaison purposes. In a practical sense, these two persons functionally become a part of the division surgeon's office, sleeping, eating, and moving along with the section as its location changes.

Although the foregoing examples of using the means at hand to meet the exigencies of the moment are not typical of extreme deviations in the matter of redistributing personnel and equipment, they do serve to illustrate the fact that it is necessary, occasionally, to require the maximum use of all Medical Service officers, regardless of their corps designation, and also to effect changes in the normal employment of equipment during combat.

Some degree of reluctance on the part of a few supply agencies to cooperate in going beyond the authorized basis of issue of equipment is to be anticipated. How well medical officers overcome the objections of those unduly bound by the literal letter of TO/E provisions is a matter which primarily involves the initiative and resourcefulness of the officer concerned.

FORWARD AREA SURGERY

In Korea, experience amply demonstrated the necessity for having young surgeons (3150 D's and 3150 C's) within the division. The professional activities of these surgeons at division clearing station level directly saved the lives of many soldiers requiring immediate major operations. The field situations encountered in Korea were unusual with regard to distances between clearing stations and the nearest army mobile surgical hospital. Abnormal transportation difficulties also added to this particular problem.

MEDICAL FIELD TRAINING

If any question remained as to the practical value of field training for all Medical Service personnel the experiences of medical officers in Korea may be relied on to dispel any doubts in this regard. No attempt will be made to relate specific examples of needless burdens, as well as risks, imposed on a number of medical officers in Korea solely because they lacked adequate field training. Suffice it to say that all Medical Service officers and enlisted personnel, regardless of professional specialty designation, or technical qualifications, should undergo intensive medical field training prior to assignment to any theater of operations.

Night operational training is of inestimable value to medical troops functioning under battle conditions. In the Far East Command most medical units performed their duties admirably during daylight hours. Until they gained experience, however, many of the units were woefully inadequate when it became necessary to conduct operations at night. This was manifested by the confusion attending the establishment of stations, closing of stations, and movements forward or rearward during hours of darkness. In many such situations, a working knowledge of map reading, proficiency in the use of the compass, and the old backwoodsman's sixth sense of direction often constituted the difference between life and death for medical personnel separated from main elements of combat troops, and also in other emergencies where it was necessary to seek cover in the mountains.

Newspaper and other reports emanating from the Far East Command have made common knowledge of the fact that display of the Geneva Cross affords no protection to United Nations medical personnel engaged in Korean operations. To the contrary, such medical elements routinely paint out, or otherwise obliterate, the red crosses on unit ambulances before taking the field in support of combat troops. Inasmuch as enemy forces in Korea disregarded the noncombative role of the Army Medical Service, it was necessary to discourage the wearing of the Medical Service brassard.

FIELD MEDICAL REPORTS

Certain improvisations relative to field medical records and reports were adopted in Korea. For example, it was soon apparent that the statistical section, basically a part of the division surgeon's office, could function more efficiently if located at the clearing station site. Consequently, personnel of the statistical section were informally placed with the medical battalion where they functioned as though they were regularly assigned personnel. This proved to be the logical location for this section's purpose inasmuch as the center of flow of casualties and records pertaining to casualties occurs at the base clearing station control point *(2)*.

(2) Editor's note: Although under certain circumstances the statistical section of the division surgeon's office may be able to perform its work relating solely to the collection of medical records and reports more effectively when it is physically located at the clearing station, to conclude from this that such an arrangement should be normally prescribed, would be to take a too limited view of the service which the statistical section, as a part of the surgeon's staff, is supposed to provide to the surgeon. The answer to the question of which arrangement is better under a given set of circumstances depends on a number of factors, including: the individual capabilities of the personnel assigned to the statistical section and of the personnel with records and reports responsibilities assigned to the medical battalion and to the regimental and other medical detachments; the extent to which the difficulties of transportation and communication, hamper effective liaison between the surgeon's office and the clearing station; and the extent to which the division surgeon calls on the statistical section to provide him with facts, figures, and analysis to aid in the planning and operation of the division's medical service.

At irregular intervals, sporadic outbreaks of certain diseases made it expedient to originate a special report known as the "Able, Baker, Charley report." This report was required from the three clearing platoons daily, and was transmitted by the most convenient means. It was materially simplified, especially when given by radio or telephone, because prior designation of a certain disease as "Able," another disease as "Baker," and still another disease as "Charley," resulted in quick reporting, e. g., "Able-10; Baker-4; Charley-3." The report was discontinued when the incidence of these particular diseases fell sufficiently as to be no longer of more than passing significance.

PROPERTY EXCHANGE PROBLEMS

During early operations in the Far East Command, property exchange frequently led to serious complications. In certain situations it broke down completely. Adding to the normal difficulties incident to battlefield property exchange were the diverse methods, such as hospital train, C-47 plane, and helicopter, employed by Army to evacuate casualties. In many instances no similar items of medical property were made available for exchange by the Army evacuating agencies to the division medical battalion. In critical situations, about 350 patients were sometimes evacuated to rearward areas by C-47 planes. These patients were transported in division ambulances to the airstrip. Often, at the airstrip there were no litters, blankets, or splints available for property exchange. It required only a few days of intensive evacuation by plane, or hospital train, without property exchange, seriously to deplete the division's stock of these items. This brief comment regarding property exchange is made in order to re-emphasize the importance of early planning, and the implementation of such planning, in connection with the establishment of medical supply dumps in strategic theater locations. Failure to accord this subject the consideration it merits will invariably result in an accumulation of needless obstacles affecting the chain of evacuation.

COLD WEATHER PROBLEMS

With the advent of winter weather in Korea some difficulties were experienced in connection with plasma and medications in solution tending to freeze because a sufficient number of stoves were not initially available to permit their use in medical supply holding agencies. Experience revealed that in cold weather, a minimum of 5 blankets per patient were required to prevent the patient from going into shock. This number of blankets per patient was in excess of early planning estimates and therefore required upward revision in stock levels. It was found also that the command post type tent used by battalion aid stations is not suitable for winter operations because of insufficient patient capacity. Therefore, squad tents were substituted, providing much better shelter for casualties awaiting medical treatment. As winter progressed, at least one fuel-burning stove, and sometimes two, were necessary to warm each squad tent containing casualties. These additional items were secured through the cooperation of the division quartermaster. Winter weather

made the use of the unmodified jeep litter ambulance impractical. These vehicles afforded the patients no practical protection from the elements. To offset this situation, many medical units improvised a canvas, or other covering, which was suspended over the back of the ambulance. Such improvisations could not be expected to provide an ideal solution, but they did offer some degree of protection to the patient while in transit.

USE OF HELICOPTERS

The feasibility of using helicopters within the infantry division for evacuation purposes was firmly established early in the Korean campaign. This type of aircraft proved readily adaptable to the evacuation of casualties in the field. They were ideally suited, to cite one example, for transporting casualties suffering from severe abdominal or chest wounds who could not have withstood the rigors of a long jolting ambulance ride. In the first stages of the campaign it was possible to borrow, at times, the much needed helicopter service from the U. S. Marines. Later, Army headquarters was successful in securing several of these aircraft from the Air-Sea Rescue Squadron. These were made available to the division on call when they were not otherwise engaged. Such an arrangement, while not to be unduly discredited, is not completely satisfactory because the availability of the helicopters to the division must necessarily fluctuate widely with each significant change in a fluid tactical situation. Helicopters proved irreplaceable in the evacuation of wounded personnel who had been cut off from the remainder of the division. In one situation alone, more than 40 casualties were successfully evacuated by this means. The far-reaching significance of this action lies in the fact that in no other manner could these wounded have been reached at the time.

In situations where helicopter service could not be obtained, and there were no other available means, single patients were brought to medical installations by L-5 planes, but the requirement for liaison-type airstrip, and the limited patient capacity of this plane, materially reduced the effectiveness of this method of evacuation.

The unanimity of opinion among army, division, and corps surgeons with respect to the capabilities of helicopters to fulfill a critical evacuation function within the division is almost certain to result in the future assignment of a reasonable number of these aircraft to combat divisions for purposes of medical evacuation.

EVACUATION DIFFICULTIES

In the Far East Command, evacuation of casualties was most difficult because of the inadequacy of roads, the extreme distances separating medical installations, and the freezing weather. These factors singly, or in combination, made it necessary to use every type of transportation within the theater at one time or another. During the hec-

tic days of the fighting in the Naktong perimeter, it was frequently necessary to transport casualties on a straw-covered bed of a 2 1/2 ton truck. Three-quarter-ton weapon carriers were also pressed into service, as were all other types of rolling transportation which happened to be available at the time. Whenever possible, air evacuation was used by the division in transporting casualties to Army evacuation hospitals in Pusan, but this method was always contingent on the availability of suitable airfields which, unfortunately, proved the exception rather than the rule.

TACTICAL EMPLOYMENT

The type of terrain characteristic of Korea directly influenced the tactical disposition of medical installations. Among the first principles to be established in this connection was the requirement that medical installations be located as near as possible to the center of the perimeter of the unit it was supporting.

LOGISTICAL SUPPORT

Logistical support was difficult to maintain in Korea. As previously indicated, roads were in a deplorable state, often one way, and because of their condition, forced motor traffic to move at very slow speeds. In addition, entire areas of the country are without railway facilities. As if further to complicate these difficulties, it was not uncommon, in planning operations, to see a fine railroad indicated on certain maps, only to learn on further investigation, that no such railway line existed. Such transportation facilities had merely been planned for future construction by the Japanese during their occupation of Korea. The initial securing of the port facilities at Inchon greatly increased the efficiency of logistic support throughout the Korean area, but the advance beyond Pyongyang would have imposed almost insurmountable difficulties in maintaining adequate logistical support to forward elements had it not been possible to capture and restore the large airfields at Pyongyang which were capable of accommodating C-47's and heavier aircraft.

CONCLUSIONS

Military-medical doctrine as currently taught in the various service schools continues to retain its basic validity in the light of field medical experiences encountered in the Korean conflict.

The medical detachment of the infantry division headquarters should be augmented by the assignment of one additional medical officer and additional medical field equipment in order to facilitate the establishment of two functional aid stations to serve division forward and rear command post elements.

The medical service of the infantry division is hampered by the lack of authorized equipment with which to set up a neuropsychiatric treatment center when the need arises. At present the necessary tentage,

litters, and other supplies must be borrowed from the various clearing company platoons, thus reducing their patient capacity.

A shortage of medical officers, and other factors, will frequently make it necessary under field conditions temporarily to use Medical Service personnel in other than their designated professional capacities.

When a campaign is conducted under the type of terrain, weather, and transportation difficulties encountered in Korea, the presence of one medical officer (3150-C) in each of the clearing platoons often means the difference between life and death for certain patients with chest or abdominal wounds.

All Army Medical Service personnel should receive intensive field training, with stress laid on the tactical and administrative aspects of field operations, prior to assignment to a theater of operations.

The statistical section, basically a part of the division surgeon's office, may be operationally more efficient when located at the clearing station level *(2)*.

Early planning, and its actual implementation in regard to establishment of medical supply dumps, is essential to the operation of a satisfactory system of property exchange.

Under the type of terrain and transportation difficulties found in Korea, the medical service of the infantry division would be greatly improved through the organic assignment of a light aircraft section. This section should consist of not less than three helicopters and two L-5-type airplanes.

Medical officers operating a medical service under combat conditions invariably are confronted with a number of acute situations, the solution for which may only be found in individual initiative, resourcefulness, and enterprise.

Chemosurgery

Gordon H. Ekblad, *Captain, MC, U. S. N.* (1)

THE chemosurgical technic of treating cutaneous and other accessible cancers as developed by Mohs (2-15) is an exceptionally reliable method for the treatment of these malignancies. Chemosurgery has been used in 25 selected patients with skin cancer at this hospital in the past 2½ years. Although the number of patients treated, and the duration of the study made, are not sufficient to make these cases of statistical value, they are presented to familiarize service personnel with this technic and to show that this type of work can be carried out in spite of the frequent changes in the technical staff which occur in the military service. Some modifications in Dr. Mohs' technic for the preparation of the histopathologic sections have been made in order to simplify the procedure. Recurrent skin

(1) U. S. Naval Hospital, Oakland, Calif.

(2) Mohs, F. E.: Chemosurgical treatment of melanoma; microscopically controlled method of excision. Arch. Derm. & Syph. 62: 269-279, Aug. 1950.

(3) Mohs, F. E.: Chemosurgery in cutaneous malignancy. California Med. 71: 173-177, Sept. 1949.

(4) Mohs, F. E.: Chemosurgical treatment of tumors of parotid gland; microscopically controlled method of excision. Ann. Surg. 129: 381-393, Mar. 1949.

(5) Mohs, F. E.: Chemosurgical treatment of cancer of extremities and trunk; microscopically controlled method of excision. Arch. Surg. 57: 818-832, Dec. 1948.

(6) Mohs, F. E.: Chemosurgical treatment of cancer of skin; microscopically controlled method of excision. J. A. M. A. 138: 564-569, Oct. 23, 1948.

(7) Mohs, F. E.: Preparation of frozen sections for use in chemosurgical technique for microscopically controlled excision of cancer. J. Lab. & Clin. Med. 33: 392-396, Mar. 1948.

(8) Mohs, F. E.: Chemosurgical treatment of cancer of eyelid; microscopically controlled method of excision. Arch. Ophth. 39: 43-59, Jan. 1948.

(9) Mohs, F. E.: Chemosurgical treatment of cancer of face; microscopically controlled method of excision. Arch. Derm. & Syph. 56: 143-156, Aug. 1947.

(10) Mohs, F. E.: Chemosurgical treatment of cancer of ear; microscopically controlled method of excision. Surgery 21: 605-622, May 1947.

(11) Mohs, F. E.: Chemosurgical treatment of cancer of nose; microscopically controlled method. Arch. Surg. 53: 327-344, Sept. 1946.

(12) Mohs, F. E.: Chemosurgical treatment of cancer of lip; microscopically controlled method of excision. Arch. Surg. 48: 478-488, June 1944.

(13) Mohs, F. E.; Sevringhaus, E. L.; and Schmidt, E. R.: Conservative amputation of gangrenous parts by chemosurgery. Ann. Surg. 114: 274-282, Aug. 1941.

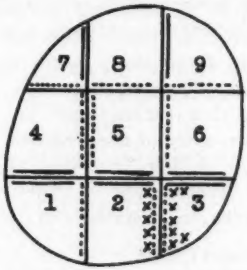
(14) Mohs, F. E.: Chemosurgery; microscopically controlled method of cancer excision. Arch. Surg. 42: 279-295, Feb. 1941.

(15) Mohs, F. E., and Guyer, M. F.: Pre-excisional fixation of tissues in treatment of cancer in rats. Cancer Research 1: 49-51, Jan. 1941.

cancers which were previously treated with x-ray and/or operation are frequently amenable to no type of treatment other than chemosurgery. It is desirable that all large service hospitals treating skin cancers be equipped to do this type of work.

TECHNIC

The chemosurgical treatment of case 1 is described step by step to show the exact procedures used. A saturated solution of di- or trichloroacetic acid is first painted on the skin of the involved area. This is necessary because zinc chloride paste will not penetrate the intact keratin layer. The acid is applied until the keratin layer turns a dead white. Zinc chloride paste, made up of 34.5 cc. of a saturated solution of zinc chloride, 10 grams of sanguinaria canadensis, and



——: edge marked with red (mercurochrome) dye.
- - -: edge marked with blue (household bluing) dye.
xxx: positive for cancer cells.

Figure 1. Diagram showing a small section of the treated area of case 1 to demonstrate how sections are demarcated and marked if positive for cancer cells.

40 grams of stibnite, is then applied to this area. The depth to which fixation is desired can be varied from about 1 mm. to over 1 cm., depending on whether the paste is applied lightly or in a thick layer. The paste is then covered with a thin layer of cotton, over which a layer of petrolatum gauze is placed to keep the dressing from drying out; this, in turn, is covered with gauze and adhesive tape to keep the dressing in place. The zinc chloride dressing is left in place over night and removed the next morning. There is little associated pain with this procedure although some patients may require an analgesic. The involved tissue is thus fixed in situ so that no anesthesia is necessary for the excision of this area.

The fixed tissue is excised in convenient sizes as shown in figure 1, and under surface of each section is cut for histopathologic examination. The areas positive for cancer are re-treated with zinc chloride paste as before and these areas are again sectioned on the following day. If these sections are negative for cancer, the treatment is complete. Incisions are made through the fixed tissue only, close to the

junction with living tissue, but far enough away so that there is no associated bleeding or pain. Every section must be complete as otherwise it will be impossible to tell whether the missing areas contained cancer or not. The microscopic control permits conservative treatment because only a few millimeters of tissue beyond the carcinomatous tissue need be removed. A biopsy specimen from all patients is sent to the laboratory for confirmation of the diagnosis.

MICROTECHNICAL PROCEDURE

For complete details of the frozen section technic the reader is referred to Mohs' original article (7). A trained technician makes the frozen sections and when necessary he can train untrained personnel in the method. The only difficulty with the frozen section technic is the time required to develop the manual dexterity which is necessary to make good whole sections of each piece of tissue. Technicians in training start by making paraffin sections using a modified technic. Although this method is not as satisfactory as Mohs' frozen section procedure because it takes about 4 hours to complete, it is easier to teach to new technicians. The slides prepared by this method are probably of slightly better quality than those prepared by the frozen section method. As the technicians become more adept at handling the tissue preparations they use the frozen section technic.

QUICK PARAFFIN BLOCK TECHNIC

The sections, as they are excised, are already fixed and no further fixative is necessary. They are placed in two changes of dioxane allowing one-half hour for each exposure. The sections are next placed directly in melted paraffin (or Fisher's tissue mat) and placed in an incubator for about 1 hour. Sections are blocked in the usual manner except that meticulous care must be exercised to insure that the section is placed absolutely flat. Two stylets from spinal puncture needles are used to place the sections evenly. One corner of the section is anchored with a stylet and held while another corner is anchored with the second stylet. The first stylet can now be removed and placed on the third corner, and so forth. Sections from 8 to 12 microns thick are then cut on the microtome and are floated into a warm water bath and mounted on glass slides that have been coated with egg albumin. They are returned to the incubator for half an hour, then stained with hematoxylin and eosin, according to the technic described by Mohs (7).

ILLUSTRATIVE CASES

Case 1. Figure 2 shows a lesion measuring 3.1 by 1 cm. which had recurred after surgical excision 18 months earlier. It was in the operative scar and extended upward over the temporal area adjacent to the left ear and onto the anterior lobe of the ear. The superior sulcus of the ear was also involved. Figure 3 shows the defect present at the completion of chemotherapy. Besides extending onto the anterior portion of the ear, which was suspected clinically, the cancer was

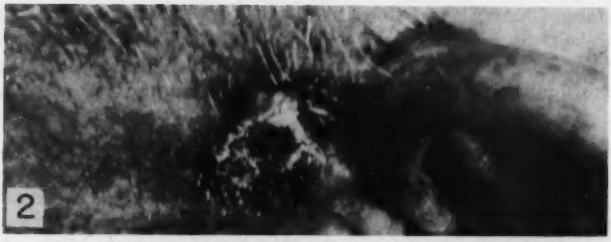


Figure 2 (case 1). 12 November 1948. Figure 3 (case 1). 24 November 1948. Figure 4 (case 1). 6 February 1950.

found to extend inferiorly in the excisional scar about 1 cm. more than was expected. Figure 4 shows the appearance 13 months after chemosurgery. Two and one half years after chemosurgery there was no recurrence.

Case 2. Figure 5 shows a basal cell carcinoma measuring 5 by 3 cm. of 5 years' duration involving the right ear and preauricular area. Figure 6 shows complete removal of the cancer after 13 dissections. The external auditory canal was involved to a depth of about 5 mm. The facial nerve was not interrupted. Figure 7 shows complete healing.

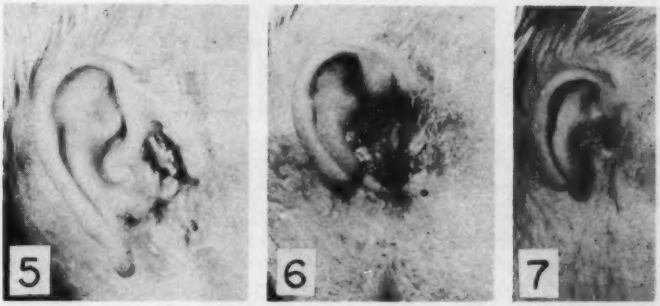


Figure 5 (case 2). 24 January 1950. Figure 6 (case 2). 10 March 1950. Figure 7 (case 2). 26 April 1950.

Case 3. A primary squamous carcinoma of the left preauricular region was treated in February 1947 by x-ray. Regional metastases occurring in April 1947 were treated with x-ray from June 1947 to May 1949. A total of 27,000 r. were given. On admission a crater ulcer of 8 months' duration (fig. 8) was present below the left ear. It measured 37 mm. by 33 mm. and was 29 mm. deep. A woody hardness surrounded the area and measured 8 cm. by 6 cm. The external carotid artery could be seen to pulsate at the base of the ulcer. The left facial nerve had been paralyzed for 4 weeks. A postradiation fibrosis of the left mandible and attached muscles had been present for 6 months. The patient had had difficulty in swallowing for 5 months and could only eat soft and liquid foods. Thirty-three chemosurgical dissections were performed (fig. 9). The positive sections extended deep to the external and internal carotid arteries and involved the transverse process of the atlas. The pharynx was penetrated at one small area but promptly healed. Figure 10 shows the healed lesion following plastic repair. Metastases recurred in the body of the atlas in November 1950, 16 months after chemosurgery. This was followed by a rapid downhill course and death 6 weeks later. The autopsy showed extensive necrosis and carcinomatous invasion of the atlas.

This was one of two failures in this series.

971621 O - 51 - 4

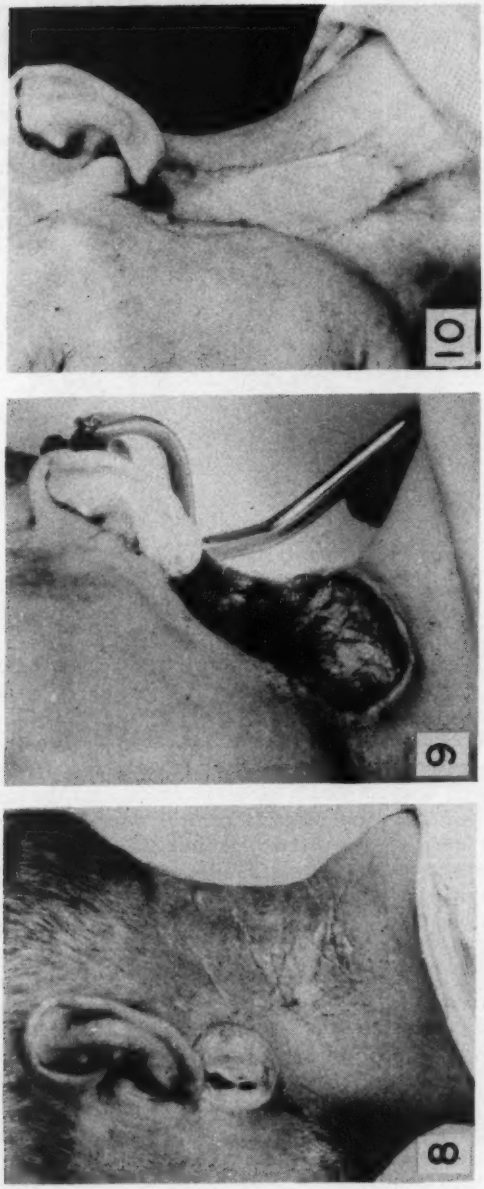


Figure 8 (case 3). 28 June 1949. Figure 9 (case 3). 18 July 1949. Figure 10 (case 3). 14 April 1950.

Case 4. This patient, admitted on 26 July 1950, had a basal cell carcinoma of the left cheek measuring 24 mm. by 34 mm. of 5 years' duration. Numerous areas of keratosis in adjacent areas made it difficult clinically to determine the extent of the lesion. Chemosurgery was completed in 5 dissections from 1 to 5 August. By 18 September healing was complete, leaving the patient with a mild ectropion of the left lower eyelid.

Case 5. This patient, admitted on 18 January 1950, had a pigmented basal cell carcinoma on the left side of the nose measuring 15 mm. by 8 mm. of 5 years' duration. The lesion was excised surgically on 24 January. Multiple biopsy specimens encircling the excised area showed an incomplete removal. The treatment was changed to chemosurgery which was completed in 5 dissections from 29 January to 2 February. By 14 March the lesion had healed and 6 months later there was no evidence of recurrence.

Case 6. A lesion of the nose was surgically removed in 1942. It recurred in 1946 and has been growing slowly. The biopsy specimen showed squamous cell carcinoma. A total of 5,100 r. was given between 21 December 1949 and 9 January 1950. Healing was slow and by 1 August there was evidence of recurrence. Chemosurgery was completed in 8 dissections from 15 August to 11 September. Daily sections were not made because a partial hemiplegia was present as a result of 5 previous cerebral vascular accidents. Because of almost complete destruction of the nose the patient was fitted with a prosthesis.

Case 7. A biopsy specimen taken on 2 May 1950 from an area of scarring and crusting measuring 25 mm. by 18 mm. in back of the left ear showed basal squamous cell carcinoma. This area had been treated with radium in 1936 and 4 recurrences had been treated with excision or electrodesiccation. Chemosurgery was completed in 2 dissections. The lesion healed promptly and after 7 months there was no evidence of recurrence.

Case 8. This patient first developed a basal cell carcinoma lesion on the inner canthus of the left eye. This was excised in 1943, but recurred in May 1945 and was widely excised. A recurrence in November 1946 was treated in June 1947 by radical excision, including removal of the left eye, most of the contents of both frontal sinuses, the anterior left ethmoidal cells, and the anterior sphenoidal cells. Microscopic sections showed involvement of sphenoidal and ethmoidal cells and of the left maxillary sinus. A delayed skin graft was performed in March 1948. A further recurrence was noted in August 1948. Radiation therapy was given in September and November 1948 and in May and June of 1949.

Chemosurgery was started in January 1950. The entire nasal cavity was found to be involved except for the interior of the right maxillary sinus. The medial wall of the right orbital tract was involved in its

entirety. The orbital plate here was not present, it having been destroyed by cancerous extension, by roentgen therapy, or by previous surgical removal. The cancerous area did not extend into the eye muscles, and this entire area of involvement was freed of cancer by chemosurgery. The tissues inferior to the right eye were heavily invaded with cancer and the cancerous area was removed down to the maxillary bone which was also invaded. Treatment here was stopped at this point so that other involved areas might be treated. The sphenoidal and the ethmoidal cells were involved and were cleared of cancerous areas. A small opening in the dura over the left ethomidal cells was produced during chemosurgical treatment. Spinal fluid leaked through this opening for 1 week, but no meningeal infection resulted. A small piece of brain tissue was removed during this procedure and was negative for cancer. The frontal sinuses, which were heavily invaded, were cleared of cancer. The left maxillary sinus was heavily invaded with cancer and was cleared down to one small area which was then left because of the inability to clear other areas of cancer. The base of the skull was removed just inferior and posterior to the frontal sinus. This area was heavily invaded down to the dura which was penetrated in one place with a subsequent leakage of spinal fluid for a period of several weeks, but no meningeal infection occurred. Treatment was discontinued after 73 chemosurgical dissections because involvement was still extensive and it was impossible to clear all of the involved areas. The patient was experiencing severe pain from the cancerous involvement and the application of the zinc chloride paste aggravated the pain. The fact that there was no hope for cure and the aggravation of pain by the treatment prompted discontinuance of chemosurgery.

This patient received penicillin every 3 hours for 2½ years following a plastic operation in May 1947. At the commencement of chemosurgery in January 1950 the injections of penicillin every 3 hours were replaced by injections of procaine penicillin in oil with aluminum monostearate given twice weekly.

This case represents the second of the two failures in this series.

SUMMARY

Chemosurgical treatment of skin cancers gives a high rate of cure as compared to other methods of treatment. It is a readily available and practical method of treatment for many types of cutaneous and other accessible cancers in which other methods are either impossible or impractical.

DISCUSSION

Frederic E. Mohs, *M. D.*

This article excellently illustrates the type of patients that are preeminently suitable for chemosurgical treatment, namely, those with cancers which have recurred after various surgical and radiologic

procedures. In other words, chemosurgery is an invaluable tool for use in the salvage of patients who otherwise would have relatively little chance of cure. Chemosurgery also may be used to advantage for the removal of early, previously untreated external cancer. The rates of cure attained by chemosurgical excision of such lesions are so high that cases of advanced external cancer become almost nonexistent in a community where this treatment has been consistently used for a few years. It is the systematic microscopic control of excision attainable with the chemosurgical technic that accounts for the unprecedented reliability in the treatment of both early and advanced accessible cancer.

Chemosurgical treatment of cancers which involve vital structures is usually contraindicated, but often it is impossible to predict whether or not such structures are involved and it may be necessary to uncover structures which ordinarily would be avoided. By the use of suitable precautions, Captain Ekblad successfully removed the large vessels in the neck (case 1) and exposed the dura in the ethmoid area (case 8), but ordinarily it is advisable to avoid these structures because of the danger of fatal hemorrhage from the carotid or jugular vessels on the one hand and because of the danger of meningitis with encephalomalacia on the other.

Although Captain Ekblad's development of the rapid paraffin method to fit his special requirements is commendable, in civilian practice, where much of the chemosurgical work is performed on an outpatient basis, the extra time involved in imbedding in paraffin would be disadvantageous. With frozen sections the patients need wait only a few minutes but it is admitted that the services of a facile and experienced technician is essential to attain the necessarily complete microscopic sections. Relatively few men have taken the time and trouble to master the chemosurgical technic although there is need for this special skill in every large community.

BOOK REVIEW

Grouping, Typing and Banking of Blood, by *Otakar Jaroslav Pollak,* M. D., Ph. D., F. C. A. P., Director, Blood Bank; Chief, Departments of Anatomical, Clinical, and Experimental Pathology; Director, School for Medical Technologists, Quincy City Hospital, Quincy, Mass.; Consultant Pathologist, Jordan Hospital, Plymouth, Mass. 163 pages; illustrated. Charles C Thomas Publisher, Springfield, Ill., 1951. Price $5.75.

In his preface, the author states that "this book is written mainly for Blood Bank personnel ..... (It) has been written to help technicians, internes and residents who have searched in vain for a brief, concise, informative text on a subject which, when discussed before them by eminent serologists, hematologists and geneticists in a highly scientific and detailed manner, was simply over their heads." This book will materially help them in the understanding of the blood groups, subgroups, types, and subtypes. There is a practical discussion of erythroblastosis fetalis, and an emotional discourse on the problems of banking blood. The chapters on administration of whole blood and blood fractions are anticlimactic. At the end of the book, there are 10 perforated pages, each bearing a chart for the conduct of laboratory tests, including testing for syphilis. The usefulness of this commendable device is largely nullified by the arrangement of the charts which are hard to follow.

Unfortunately, the author attempts to provide both an elementary discourse and a highly detailed laboratory manual, including even the production of standardized grouping and typing sera. Many equivocal statements are made. The laboratory technics advocated are not always the best available, but the newer technics using enzyme treated cells for the detection of incomplete antibodies are included. The presentation of the Coomb's test is confusing. The author here and in his discussion of anaphylactic reaction to transfusion claims the development of an antibody produced in the human serum by the parenteral administration of human serum protein. If there is a need for a book of this sort, this edition is not the answer, because of the numerous errors which only the experienced will detect.

—*Lt. Col. A. S. Benenson, MC, U. S. A.*

Proper Use of the Outpatient Clinic

Warner F. Bowers, *Colonel, MC, U. S. A.* (1)

IN THE Army it has been traditional to regard outpatient and dispensary work as distasteful and fit only for junior officers who have no recourse. This attitude has been fostered to the point where many hospitals have outpatient clinics as a separate service with a full-time assigned staff or with residents assigned for 6-month rotations. As things now stand when senior residents finish their training in surgery they expect to be occupied full time with gastrectomies and pneumonectomies and feel greatly injured at the prospect of any assignment where it may be necessary to see dispensary patients. This attitude is unwholesome, unrealistic, and leads to personal dissatisfaction. It should be realized that private practice, at least in a physician's first few years, is made up largely of the type of patients we call outpatient or dispensary cases and the young physician is delighted to see them fill his waiting room. It must be realized also that outpatients are quite a diagnostic challenge because they present themselves without a handful of laboratory and x-ray reports. The physician who sees only inpatients loses the chance to make early diagnoses and loses his sense of discrimination as to what tests and examinations are pertinent. This has lead to the abominable "routine workup" concept where every patient gets a blood calcium determination, a BMR, a multiple lead ECG, et cetera on the off chance that these tests may show something. He is also likely to get a large injection of several antibiotics to tide him over while the various reports are being typed and filed. If the reports are negative and the patient is still not well after the antibiotic administration, the doctor will then consider the possibility that a physical examination may be needed. If this sounds like an exaggeration I can vouch for the fact that such a procedure has been encountered many many times in recent months. A return to fundamentals is a crying need and what is more fundamental than that the physician should see and work up his own patients? With the present system many patients complain of the cold

(1) Surgical Consultants Division, Office of the Surgeon General, U. S. Army

impersonal attitude and institutionalized atmosphere of our system when they see Dr. A in the outpatient clinic for a workup, are admitted to the hospital, and operated on by Dr. B, and return to the outpatient clinic for followup by Dr. C.

Probably the best way to put across the concept of the proper use of the outpatient clinic is to give a concrete example of how it could be handled. It is granted that probably one full-time physician (who can see patients in some special field of his own interest to keep up his professional attainments) is needed in the outpatient clinic as a general coordinator. Under him, the chief of the surgical service from the hospital is responsible for the staffing and running of all the special surgical clinics. The chief of the surgical service then places each section chief in charge of his special clinic and the section chief assigns each of his ward officers and interns to a specific period each week when he is responsible for the outpatient work. In figuring the manning guide for a surgical service, it is assumed that there will be a chief of service, an assistant chief of service, and an anesthetist basically, and one medical officer for each ward who in addition to his ward duties can spend one-half day a week in the outpatient clinic. The chief of service should give general supervision to make full use of teaching material, but should also have one specific period each week in the outpatient clinic to see his own new and follow-up patients. As an example, Captain D of Ward 8 is responsible for Tuesday afternoon in the surgical outpatient clinic each week and there he sees Private E who has a hernia. When Private E is admitted to the hospital, he is known to the admitting officer to be Captain D's patient and is admitted to Captain D's ward. Because they are already known to each other, Private E does not have a feeling of being in a completely new environment surrounded by strangers. Captain D then arranges for Private E's operation, performing it himself or being assistant to or assisted by a more experienced man as circumstances require. When Private E is ready to leave the hospital, Captain D arranges with the social service worker for Private E to come to the Tuesday afternoon outpatient clinic at suitable intervals where he again is seen and followed by Captain D. All members of the service in this way develop an interest in patients as people rather than cases and the patients see medical officers as friendly advisors rather than as unknown figures clad in white coats and emitting big words. The medical and neuropsychiatric services are organized in the same way.

This system is simple, is not different from what is done in civilian—and especially in university—practice, and insures an improved doctor-patient relationship together with a more healthy and realistic outlook on the part of the physician. The fact that this system is not in use now does not mean either that it is not good nor that it will not work. It simply means that it is easier to assign a physician to 6 months in the outpatient clinic and let him sweat it out than it is to follow a system which will give more proper status to outpatient care.

Roentgenographic Technics in Dentistry

Francis P. Cassidy, *Captain, DC, U. S. A.*

RADIOGRAPHY has become an integral part of the dental diagnostic workup. It is the only sure means by which (1) pathologic changes of hard tissues, such as caries, abscesses, cysts, granulomas, osteomyelitis, bone tumors, periodontal lesions and fractures; (2) overhanging fillings; (3) abnormalities in root form; (4) retained and impacted teeth; and (5) many other conditions may be detected and accurately located. A dentist does not produce radiographs of high quality simply by owning fine equipment and pushing a button. On the other hand he need not take intensive courses in radiographic technic and interpretation. The greatest plea of the leading radiologists is that dentists develop a standardized technic *(1)* and be able to read and interpret their films intelligently. This requires a familiarity with the anatomic structures involved, variations within the normal, and variations which are pathologic.

For a number of years after the discovery of x-rays, the profession as a whole failed to adopt a consistent means of producing radiographs. The first radiographic method to be standardized was the bisecting angle technic with an 8-inch focal spot film distance. The placement of the film is governed by the anatomic variations of the area of the mouth being examined. Part of the film touches the incisal edges or lingual cusps of the teeth, and the rest of the film is inclined to form an angle with the long axes of the teeth, the degree of inclination depending on the structural limitations. To obtain an image having the same length as the teeth, the central beam of the x-ray is directed through the apexes of the teeth and perpendicular to the bisector of the angle formed by the mean planes of the film and the teeth *(2)*. Rays directed perpendicular to the plane of the teeth produce elongation. Those directed perpendicular to the plane of the film produce foreshortening.

(1) Ennis, L. M.: Dental Roentgenology. 3d edition. Lea & Febiger, Philadelphia, Pa., 1939. p. 16.

(2) Ward, M. L. (editor): American Textbook of Operative Dentistry. 7th edition. Lea & Febiger, Philadelphia, Pa., 1940. p. 40.

Maxillary molars present the greatest difficulty for two reasons. The first handicap is the physical make-up involved. The height of the vault and length of the alveolus greatly influence the inclination of the film. A high vault and long alveolus are most nearly ideal because this situation provides for more nearly parallel film placement. The zygomatic process is almost always included in this roentgenogram, superimposed on or above the images of the teeth (fig. 1B). Second there is the problem of the separation and divergence of the buccal and palatal

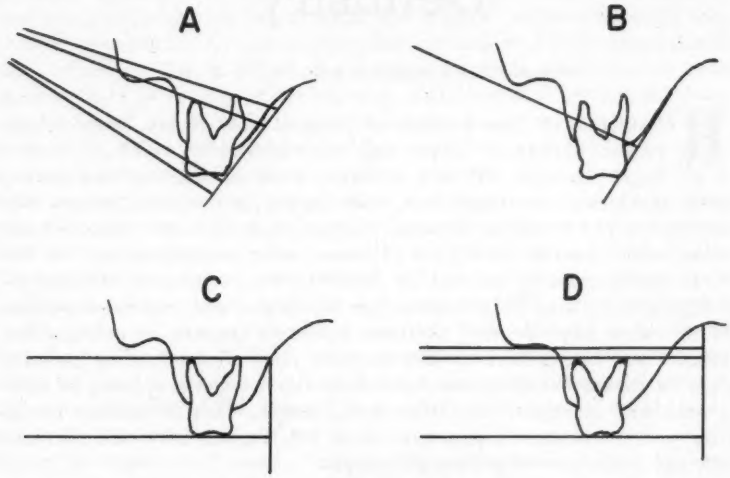


Figure 1.

roots. Thus when the rays are directed perpendicular to the bisecting plane, the images of the palatal roots and lingual cusps will be higher than those of the buccal roots and buccal cusps (fig. 1A). Directing the rays from higher up gives a truer image of the palatal roots but foreshortens the buccal roots, while a more horizontal approach accurately reproduces the buccal roots but lengthens the palatal roots.

If the teeth were merely two dimensional entities there would be no difficulty because we would not be dealing with mean planes. The anterior teeth more closely fit this classification in that they have but one root. The films which exhibit the most exact reproduction of the true size and shape of the teeth are those involving the lower molars. This accuracy is possible because of the vertical surface of the lingual portion of the alveolus in the region, allowing a film placement which is parallel with the axes of the teeth. If the film is placed too close to the upper molars in using the parallel film placement, the apexes of the roots will not show (fig. 1C). By moving the film back to the midline of the palate, the apexes may be included and the image of the zygoma

will be shown above the tooth (fig. 1D) rather than on it as in figure 1B. It has long been recognized that bite-wings furnish the most reliable picture of caries, again because of the nearly parallel film positioning. Such images are free of distortion of parts which results when exposures are made at an angle.

A few of the early investigators reasoned that parallelism of all intraoral films would facilitate the interpretation of roentgenograms because in effect each film would be a periapical bite-wing *(3)*. McCormack *(4)* produced excellent radiographs but his method proved to be impractical for the average dental office. His positioning of the patient was not possible with standard dental equipment and 1 hour was required for a complete set of intra- and extraoral pictures. Furthermore, he used focal-spot film distances of up to 40 inches, thus becoming one of the first dentists to support the contention, long held by medical radiologists, that increased cone lengths produce much less diffusion of detail. In recent years, these conceptions of parallelism and long-tube technics have been formulated by Fitzgerald *(5)* into a practical and standard procedure. He has described an efficient method for placing films in the mouth in a plane parallel to that of the teeth. His experiments with various cone lengths have proved conclusively the advantages in image sharpness to be derived from an increased focal spot-film distance.

An understanding of the physics involved is necessary in conveying the principles of the long-tube technic. Ideal radiographs could be produced if the x-ray beams were parallel, giving shadow images of the same dimensions as the object. This would hold regardless of the focal spot-film and object-film distances. In reality, however, the beams are divergent resulting in adumbration and magnification on the film. Of these two unfavorable qualities, adumbration or aberration of detail is the more serious in most instances. Undistorted magnification would not be a bad quality but such enlargement is not the case where three dimensional objects are concerned. Those parts farthest from the film are more greatly magnified than those in closer proximity and an untrue image is formed (fig. 2). The most striking example of this is the enlargement of the zygoma in a maxillary molar picture.

Adumbration is a consequence of x-radiation emanating from a plane rather than a point (fig. 3A). The result is a crisscrossing of rays through the structures, causing a lack of detail on the film *(6)*. Three

(3) Waggener, D. T.: Principles of extension cone technique. J. Missouri State Dent. Convention 30: 204, June 1950.

(4) McCormack, F. W.: Plea for standardized technique for oral radiography. J. Dent. Res. 2: 467, Sept. 1920.

(5) Fitzgerald, G.: Dental roentgenology; II: Vertical angulation, film placement and increased object-film distance. J. A. D. A. 34: 160, Feb. 1947.

(6) Fitzgerald, G.: Dental roentgenology; I: Investigation in adumbration or factors that control geometric unsharpness. J. A. D. A. 34: 1, Jan. 1947.

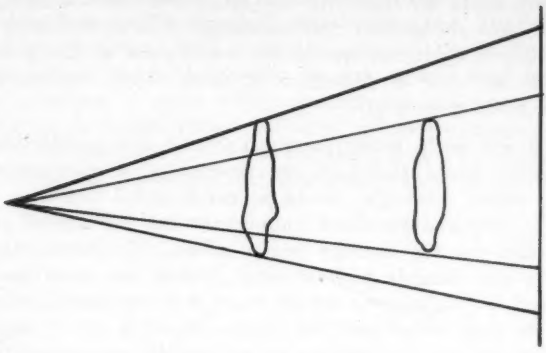


Figure 2.

variables are involved in the control of adumbration and magnification: (1) the object-film distance, (2) the focal spot-film distance, and (3) the effective focal spot size. The more closely the film is placed to the part being radiographed, the more distinct and less distorted the roentgenogram will be (fig. 3B). Absolute contact would afford a more nearly perfect image, but anatomic make-up imposes a limit on the approximation of film and teeth (7).

Because adumbration is the result of crisscross beams, it follows that by decreasing the effective focal spot size, the adumbral effect will be lessened (fig. 3C). Although it is impossible satisfactorily to compensate in this manner alone because there is a limit to how small the effective focal spot size may be, modern x-ray units are being made with the smallest effective focal spots in order to take advantage of every corrective possibility. Increasing the focal spot-film distance (fig. 3D) is the most practical means of minimizing the effect of divergence of the rays and this is one of the basic tenets of the Fitzgerald technic. As the source of radiation is withdrawn from an object, rays passing through the object tend to become more parallel and the focal spot becomes more pointlike in effect. The more nearly parallel the rays become the closer the roentgenogram approaches the ideal. Practicality limits the extent to which the cone length may be increased.

In order properly to position films in the mouth on a plane parallel with that of the teeth, it is often necessary to place the film at some distance from the teeth, especially when x-raying the maxillary teeth. Such a measure would seem to be contraindicated in the light of the contention that enlargement and diffusion are increased as the film is placed further from the teeth, but the effectiveness lost by an in-

(7) Richards, A. G.: Roentgenographic techniques made to order. J. A. D. A. 39: 396, Oct., 1949.

creased object-film distance is more than offset by the greater cone length. If short-cone technics are used, the leeway in object-film distances is very small, but as the cone length increases this tolerance becomes greater (cf. figs. 3A and 3D).

Fitzgerald conducted a series of experiments with various focal spot-film distances, film-object distances and focal spot sizes, and concluded that there is a much greater degree of latitude in film place-

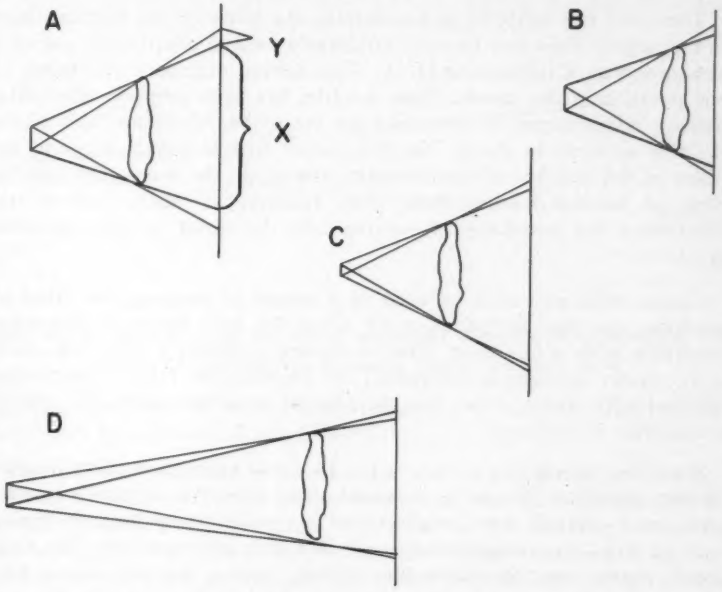


Figure 3. X *is the umbra or interior portion of the image and* Y *is the penumbra or blurred portion.*

ment with a 20-inch cone as compared to an 8-inch cone. Using the shorter cone, diffusion of detail and magnification are much more apparent as the film is moved away from the tooth. The most noticeable changes occur in images of the osseous tissues and structures like the periodontal spaces, apexes of teeth, and root canals (6). When larger focal spot sizes were used the changes were even more striking. This work illustrates conclusively that greater cone lengths and smaller focal spots more than compensate for the increased object-film distances required of the parallel film technic.

When using a parallel film positioning, the film-object distances vary markedly according to the region involved. The first step in this procedure is a clinical examination of the oral structures and the inclination of the teeth. The film packet should be placed in the mouth

so that its plane is parallel to the long axes of the teeth to be x-rayed. Lower molar films may be placed close to the teeth, but in all other areas the film must be well away from the teeth. Such positioning places the packet in the most spacious regions of the mouth, thus allowing efficient and absolute parallelism of the two planes *(5)*. A metal backing for the films is advised to insure a flat, nonyielding packet. This eliminates the dangers of distortion resulting from bent films.

There are two methods of maintaining the films in the correct plane in the mouth. They may be most efficiently held in position by use of a hemostat with a rubber bite block. This device permits a placement in any position of the mouth. When the film has been properly alined the patient is instructed to bite down on the rubber block and this holds the film securely in place. The film packet lies at a right angle to the plane of the handles of the hemostat; therefore, the x-ray cone may be directed parallel to this plane when exposure is made. Such an aid eliminates the necessity of peering into the mouth to line up cone and film.

Cotton rolls may also be used as a means of securing the films in position, but this method does not allow the wide range of placement available with a hemostat. When a patient presents a wide low arch, it is almost impossible adequately to maintain the film at the proper interval with cotton rolls. For the sake of standardization, the use of a hemostat is preferred.

Because the exposure time varies in direct proportion to the square of the spot-film distance, it would seem that the correct exposure time for a 20-inch cone length would be prohibitively long. In theory this is true, but compensatory measures may be employed. The cone itself serves to concentrate the primary beams and eliminates secondary radiation, and the time factor is further decreased by the use of fast emulsion film. The result is an exposure only slightly longer than average.

Most dentists now agree that radiographs produced by the long-tube technic, are vastly superior to others, but some contend that the method as described by Fitzgerald is for the office of the general practitioner, that the 20-inch tube is too bulky and that the advocated 26 exposures require too much time. In order to make available to *all* dentists the advantages of a long tube technic, several investigators have proposed modifications of Fitzgerald's concepts.

Williams *(8)* has outlined an approach which may conveniently be employed by any busy dentist. In place of the 20-inch cone and 26 exposures he uses a 14-inch cone and the standard number of films. Shortening the cone length slightly decreases the definition of detail

(8) Williams, S. W.: Paralleling technic for intra-oral roentgenography; oral presentation. A. D. A. Annual Convention, Atlantic City, N. J., Nov. 1, 1950.

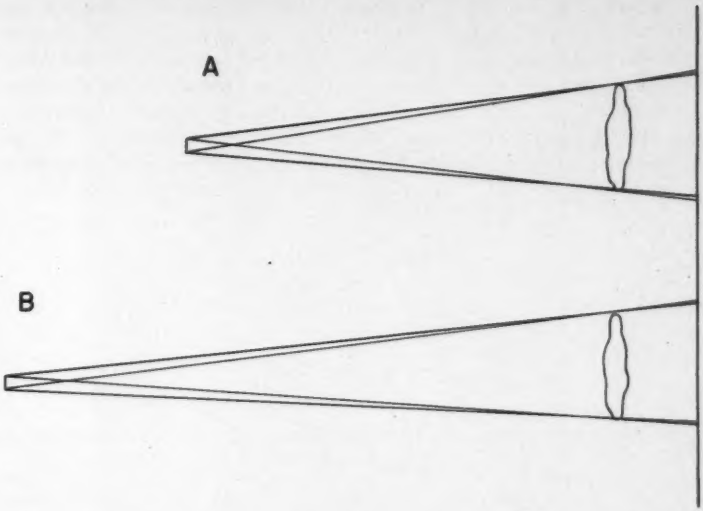


Figure 4. Diagram showing the almost negligible decrease in adumbration with increased focal spot-film distances beyond a certain point.

and the tolerance in object-film distance, but this sacrifice seems justifiable for the sake of adaptability and practicality.

Studies have shown that adumbration and magnification are greatly reduced as the cone length is increased from 8 to 14 inches, and that beyond 14 inches this reduction tapers off as the distance is further increased (fig. 4). Films exposed at the 20-inch tube length do not exhibit the ultimate in radiographic perfection; all other factors notwithstanding, the ideal is approached as the focal spot-film distance is increased toward infinity. Fitzgerald arrived at the 20-inch figure as the one most suiting his needs. It has been adopted by several schools for teaching purposes. Dentists desirous of using an extended cone technic should work out for themselves the method which they may follow with the greatest efficiency.

SUMMARY

In radiographs made according to the bisecting angle technic: (1) the structural images are often distorted in size and shape; (2) lack of detail and sharpness is the rule rather than the exception; (3) the tolerance in object-film distance is very limited; and (4) superimposition of adjacent structures often masks the images of the areas being examined, especially in the upper molar region.

A technic of parallelism and increased cone length does not completely eliminate these shortcomings, but it does alleviate them to a

large degree. Parallel film placement affords undistorted images and greatly lessens the amount of superimposition. Adumbration is controlled by focal spot-film distance, object-film distance and focal spot size. The focal spot-film distance should be the longest practicable for the individual dentist. The object-film distance should be within the range of effectiveness and sharpness determined by the cone distance. The focal spot should be the smallest size available.

BOOK REVIEW

The Growth, Replacement, and Types of Hair, by *J. B. Hamilton* and *A. E. Light* (Conference Chairman), *P. Alexander, B. L. Baker, R. S. Bear, G. W. Bissell, R. J. Block, E. O. Butcher, O. H. Duggins, F. Ellinger, N. C. Foot, S. M. Garn, A. Giroud, M. H. Hardy, L. P. Herrington, C. W. Laymon, C. P. Leblond, A. A. Liebow, R. J. Myers, C. R. Noback, J. P. Parnell, E. L. Reynolds, H. J. Rugo, W. F. Storey, L. W. Thigpen, M. Trotter,* and *S. B. Wolbach.* Consulting Editor, *J. B. Hamilton.* Editor, *Roy Waldo Miner;* Associate Editor, *B. J. Henegan.* Annals of the New York Academy of Sciences, Volume 53, Art. 3, pages 461-752. 288 pages; illustrated. New York Academy of Sciences, New York, N. Y., publishers, March 27, 1951. Price $4.

This volume, in magazine form, includes 27 articles by various authors, and is a result of a conference on the growth, replacement, and types of hair, held by the Section of Biology of the New York Academy of Sciences in February 1950. The conference was organized with the idea of assembling known facts on many phases of hair growth and development with special emphasis on new and hitherto unpublished research work. The articles represent an exhaustive study of hair in mammals, covering the subject from embryology and histology through, and including, the effects of ionizing radiation. Certain aspects, such as pigmentation, bacteriologic effects, and the cosmetics of hair waving, were omitted in order to keep the conference within reasonable limits. The subject matter is otherwise extensively covered and this volume is an excellent reference work. Therapy, quite naturally, is not included in any of the papers.

—*Capt. L. K. McClatchie, MC, U. S. N.*

Lymphogenous Cysts of the Mediastinum

Cystic Hygromas, Pericardial Cysts, and Pericardial Diverticulums (1)

Robert B. Brown, *Captain, MC, U. S. N.*

Robert G. Dunn, *Lieutenant, MC, U. S. N.*

THIS study was stimulated by a desire to classify properly an asymptomatic, thin-walled, cystic tumor removed at operation from the mediastinum of a young, white man. These simple cystic tumors, located as a rule in the anterior mediastinum, have been designated as mediastinal cystic hygromas or lymphangiomas, pericardial cysts, or, if communicating with the pericardial sac, as diverticulums of the pericardium.

MEDIASTINAL CYSTIC HYGROMAS OR LYMPHANGIOMAS

In 1904 Seidel (2) reported a cystic tumor of the mediastinum found at autopsy in a 2-year-old child. This lesion involved the thymus and is cited by Ewing (2) as a mediastinal lymphangioma. Lenkeit (3) and Eliaschewitsch (4) also found intrathoracic lymphangiomatous tumors at autopsy. Lenkeit described one of the epicardium and Eliaschewitsch, one of the pericardium. Both were located entirely within the pericardial sac.

Michaelis (5) discussed intrathoracic lymphangiomas and referred to them as the rarest of mediastinal cysts. He reported an 8-month-old child on whom operation was unsuccessful. At postmortem examination a cervical component of the lymphangioma was demonstrated. This must be considered a combined cervicomediastinal hygroma.

---

(1) U. S. Naval Hospital, Philadelphia, Pa.

(2) Seidel, I. D.: Inaug. Dissert., Leipzig, 1904. Cited by Ewing, J.: Neoplastic Diseases. 4th edition. W. B. Saunders Co., Philadelphia, Pa., 1940. p. 1001.

(3) Lenkeit, W.: Zysten des Epi- und Perikards. Centralbl. f. allg. Path. u. path. Anat. 44: 97-100, Dec. 10, 1928.

(4) Eliaschewitsch, P. A.: Ein Fall von Perikardcyste. Virchows Arch. f. path. Anat. 270: 868-872, 1929.

(5) Michaelis, O. (Berlin): Die intrathorakalen cystischen Lymphangiome. Deutsche Ztschr. f. Chir. 242: 250-256, 1934.

971621 O - 51 - 5

The first mediastinal lymphangioma successfully operated on was reported by Skinner and Hobbs (6). The patient was a 7-year-old child who complained of tightness in the chest, orthopnea, and nonproductive cough. After study a mediastinal cyst was suspected. A large, multiloculated cyst, adherent to the right diaphragm, inferior vena cava, pericardium, and thymus was treated by evacuation, excision, or destruction of successive loculations by a two-stage operation. Convalescence was complicated by empyema, but recovery was complete. Microscopic study of the excised specimen showed hyaline fibrous tissue with scattered areas of fat cells, foci of lymphocytes, blood vessels, occasional smooth muscle fibers, and large and small cystic areas lined with a single layer of flattened endothelium.

Stout (7), Heuer and Andrus (8), and Lambert (9) discussed mediastinal lymphangiomas but contributed no cases of their own. Lambert's interest in these cystic tumors was centered on their differentiation from pericardial cysts. He stated that in many respects these two lesions are similar. Both are probably congenital in origin. Both have walls composed of loose fibrous tissue and are lined by a layer of flattened cells. Although the cells are probably mesothelial in hygromas and endothelial in pericardial cysts, it is impossible to distinguish the two histologically. Lambert continued by saying that lymphangiomas are multilocular and are composed of a conglomerate mass of individual cavities which vary greatly in size. In addition, they are intimately incorporated with the various structures amid which they are situated. There is no sharp line of cleavage, they cannot be shelled out, and they receive their blood supply from all sides.

Sanes et al. (10) reported the operative removal of an asymptomatic grapefruit-sized cystic lymphangioma from the right upper portion of the mediastinum of a 59-year-old man. The lesion was well encapsulated and was mobilized and removed from its position between the trachea and esophagus with but moderate bleeding. The microscopic findings were essentially those described by Skinner and Hobbs (6) and Lambert (9). Watson and Diamond (11) found 1 cystic hygroma among 13 surgically explored mediastinal tumors in Navy personnel. Details of this case are not available except as obtained by Gross and Hurwitt (12) through a personal communication with Watson. It is stated

(6) Skinner, G. F., and Hobbs, M. E.: Intrathoracic cystic lymphangioma. J. Thoracic Surg. 6: 98-107, Oct. 1936.

(7) Stout, A. P.: In discussion of article by Foot, N. C.: Tumors of mediastinum. New York State J. Med. 39: 999-1004, May 15, 1939.

(8) Heuer, G. J., and Andrus, W. DeW.: Surgery of mediastinal tumors. Am. J. Surg. 50: 146-224, Oct. 1940.

(9) Lambert, A. V.: Etiology of thin-walled thoracic cysts. J. Thoracic Surg. 10: 1-7, Oct. 1940.

(10) Sanes, S.; MacManus, J. E.; and Scatchard, G. N.: Cystic lymphangioma of mediastinum. J. Thoracic Surg. 14: 253-258, June 1945.

(11) Watson, W. L., and Diamond, H. D.: Surgical thoracic tumors in Navy personnel. J. Thoracic Surg. 16: 1-11, Feb. 1947.

(12) Gross, R. E., and Hurwitt, E. S.: Cervicomediastinal and mediastinal cystic hygromas. Surg., Gynec. & Obst. 87: 599-610, Nov. 1948.

that the tumor involved the trachea and superior vena cava in a 24-year-old man. The cyst was successfully resected.

Gross and Hurwitt *(12)* reported a mediastinal cystic hygroma in a 32-year-old man. The lesion was asymptomatic and was diagnosed as a mediastinal tumor or cyst by means of roentgenograms. At operation a multilocular cyst, the size of two fists, was removed from the anterior mediastinum on the right where it was lightly adherent to the pericardium. The fluid content was clear and amber colored. Microscopic examination showed "a typical hygroma, the walls of which were formed by loose connective tissue, the spaces being lined by an endothelium." The most recent report of a mediastinal cystic hygroma is that of Curreri and Gale *(13)*. The lesion was found at operation in a 4-year-old child. Data on the treatment and result are not available.

To summarize the information gathered from these reports on mediastinal cystic hygromas, it may be stated that they are regarded by most as congenital lesions. Their exact origin has not been established. Eigler *(14)* and Michaelis *(5)* suggested that they grow down from the neck. Skinner and Hobbs *(6)* hypothesized that a portion of the anlage for vessel formation could be drawn down from the region of the gill cleft by the pericardium in its descent. Cystic hygromas are usually multilocular. The fluid content is most often thin and colorless. These cysts tend to become adherent to and grow between and around contiguous structures without any sharp line of cleavage. The cyst wall is fibrous and may contain scattered smooth muscle fibers, foci of lymphocytes, nerve fibers, and clusters of fat cells. These latter elements may be neighboring tissue incorporated in the cyst wall by its growth rather than an integral component of the wall itself. The cyst lining is composed of a single layer of flattened cells, probably mesothelium.

Table 1 summarizes the 7 published cases which, on the basis of the above criteria, we believe may be classified as mediastinal hygromas. Excluded are cervicomediastinal and intrapericardial lesions. This group is too small for a statistical study.

PERICARDIAL CYSTS

In 1929 Dufour and Mourrut *(16)* found at autopsy a "lymphatic cyst" in the anterior mediastinum of a woman, aged 86 years, who had died of cerebral softening. This cyst was in juxtaposition to the pericardium, was lined by flat endothelial cells, and contained about 120 cc. of

(13) Curreri, A. R., and Gale, J. W.: Mediastinal tumors. Arch. Surg. 58: 797-818, June 1949.

(14) Eigler, W.: Ueber endothorakale Zysten. Deutsche Ztschr. f. Chir. 199: 133-141, 1926.

(16) Dufour, H., and Mourrut: Kyste de la partie superieure du pericarde chez une femme de quatre-vingt-six ans. Bull. et. mem. Soc. med. d. hôp. de Paris 53: 1482, Dec. 30, 1929.

TABLE 1. *Mediastinal cystic hygromas*

Author	Date	Number of patients	Age (years)	Sex	Symptoms	Location	Treatment
Seidel *(2)*	1904	1	2	–	–	Involved thymus	None; found at autopsy
Skinner and Hobbs *(6)*	1936	1	7	M	Tightness in chest, orthopnea, cough	Right—involved diaphragm, thymus, inferior vena cava, and pericardium	Excision—successful
Bumin *(15)*	1939	1	25	M	–	Involved diaphragm and pericardium	Excision—successful
Sanes et al. *(10)*	1945	1	59	M	Asymptomatic	Right—between trachea and esophagus	Excision—successful
Watson and Diamond *(11)*	1947	1	24	M	–	Involved trachea and superior vena cava	Excision—successful
Gross and Hurwitt *(12)*	1948	1	32	M	Asymptomatic	Right—involved pericardium	Excision—successful
Curreri and Gale *(13)*	1949	1	4	–	–	–	–

(15) Bumin, H.: Cystic lymphangioma of mediastinum. Türk. tib cem. mec. 5: 116-118, 1939. Cited by Gross and Hurwitt *(12)*.

orange-colored fluid. On the basis of this report these authors have been credited with describing the first pericardial cyst. Hart *(17)*, however, in 1837 referred to a case mentioned by Boyer in his "Traite de Maladies Chirurgicales" which he (Hart) believed may have been a pericardial cyst. Atayas-Maraty *(18)*, also found at a postmortem examination a pear-shaped "diverticulum" in the anterior mediastinum. This was connected to the pericardium but did not communicate with the pericardial sac so that it was in truth a cyst. The structure of the wall was comparable to that of the pericardium and the cyst contained 80 cc. of yellow fluid.

Yater *(19)* described a cyst of the pericardium found at autopsy in a white man, aged 52 years, who had died with gastric carcinoma. The cyst was intimately associated with the parietal pericardium on the left and was situated just above the diaphragm. It was thin-walled, multilocular, and contained clear yellow fluid. The author diagnosed this a "cyst of the pericardium" and suggested that it was probably derived from a lymphatic vessel of the parietal pericardium. We have included this case with the pericardial cysts but it may have been a mediastinal lymphangioma. Lack of histologic data on the cyst wall makes sharper classification difficult.

The case of "pleuro-diaphragmatic cyst" reported by Pickhardt *(20)*, was unique from two points of view. It was the first of these cysts successfully operated on and was symptomatic. The patient was a woman 53 years old who complained of a sharp, knifelike pain over the precordium. The tumor mass was demonstrated by roentgenograms and thoracoscopy. At operation a thin-walled cyst was found in the left costophrenic angle at the junction of the diaphragm, apex of the pericardium, and the thoracic cage. It was about the size of an orange and was easily shelled out with little bleeding. A smaller cyst, 1.5 cm. in diameter, adjoined but did not communicate with the larger cyst. The inner walls of the cysts were of acellular fibrous tissue which was dense and laminated. The outer layer was not so dense and was rich in cells resembling lymphocytes. The blood vessels were few. The inner surface was covered with deeply staining cells of an endothelial type. The patient was relieved of precordial pain following operation.

Rizzi *(21)* found a cyst of the pericardium at postmortem examination of a man 53 years of age who had died an accidental death. The cyst projected from the anterior aspect of the pericardium to the right, measured 3 by 10 cm., and was smooth and shiny in appearance. Its wall was similar to the fibrous layer of the pericardium. No endothelial

(17) Hart, T.: An account of hernia pericardii. Dublin J. M. Sc. 11: 365, 1837.
(18) Atayas-Maraty, M.: Spitalul 15: 33, 1895. Cited by Cushing *(46)*.
(19) Yater, W. M.: Cyst of pericardium. Am. Heart J. 6: 710-712, June 1931.
(20) Pickhardt, O. C.: Pleuro-diaphragmatic cyst. Ann. Surg. 99: 814, 1934.
(21) Rizzi, I.: Cisti e diverticoli del pericardio. (Studio critico e contributo anatomo-patologico.) Cuore e circolaz. 19: 539-570, Sept. 1935.

lining was demonstrable. Bartolozzi *(22)* found a cyst arising from the right side of the pericardium in a woman 80 years old who died of myocarditis. It was the size of a man's fist and contained limpid yellow fluid. No description of the cyst wall was given.

Churchill *(23)* described a cyst found at operation as a simple hydrocele of the mediastinum. It was located anteriorly and to the right, but no specific mention was made of its situation in relation to the pericardium. The pathologist described the cyst as thin-walled and assumed the lining to be "mesothelium," saying: "These mesothelial cells are ordinarily so thin that they can hardly be distinguished from endothelium but they occasionally thicken up to a cuboidal type of cell that looks quite like epithelium."

Weiss *(24)* reported a fist-sized globular roentgenographic shadow adjacent to the right border of the heart in a man 36 years old who had heart disease. The mass transmitted cardiac pulsations. At operation an apple-sized, smooth-walled cyst was easily removed. The wall was composed of firm fibrous tissue and no "epithelial" lining could be found. This was "assumed to be a pericardial cyst."

Lambert *(9)* reported 3 cases which were strikingly similar in many respects. The cysts were unilocular and were on the left, lying in direct contact with the anterior chest wall, pericardium, and adjacent pleura. They shelled out readily at operation. The blood supply came either from the pericardium or the diaphragm. The cysts were lined by a membrane composed of flattened cells closely applied and resembling swollen vascular endothelium. These cells rested on a very loose-textured vascular fibrous tissue and a moderate amount of fat tissue. A few smooth muscle cells were seen. These cysts appeared to be lined with endothelium but differentiation from mesothelium was not possible. Lambert believed that these cysts did not fit into the lymphangiomatous group. He suggested that it was not only possible but probable that they were formed by abnormalities in development of the pericardial celom.

Greenfield et al. *(25)* reported a "spring water" cyst of the mediastinum. They stated Churchill was first to use this description. The patient was a woman 44 years old who complained of sudden, severe constricting pain across the anterior portion of the chest. A diagnosis of cyst of the mediastinum was made following fluoroscopy, teleroentgenography, and angiocardiography. At operation a tense globular cystic mass was found in the anterior portion of the mediastinum. It covered the upper half of the pericardium and was grapefruit sized. It

(22) Bartolozzi, M.: Rare malformazioni del sacco pericardico. Riv. osp. 26: 355, 1936.
(23) Cabot case No. 23492—Simple cyst of mediastinum. New England J. Med. 217: 958, 1937.
(24) Weiss, F. H.: Seltene benigne Thoraxtumoren. Röntgenpraxis 11: 85-92, Feb. 1939.
(25) Greenfield, L.; Steinberg, I.; and Touroff, A. S. W.: "Spring water" cyst of mediastinum; case report. J. Thoracic Surg. 12: 495-502, June 1943.

was densely adherent superiorly, but its origin could not be demonstrated. The content was crystal clear fluid. The cyst wall was tissue paper thin with a smooth inner surface. The pathologic diagnosis was mediastinal cyst lined by columnar epithelium. The authors believed that their cyst was neither a lymphangioma nor a pericardial celomic cyst but was quite similar to the cyst previously described by Churchill *(23)*.

Blades *(26)* found 10 pericardial cysts included in a group of 94 benign mediastinal tumors treated surgically in the Army thoracic centers. All were asymptomatic. All were discovered by routine chest roentgenograms and were described by the author as thin-walled structures usually in contact with the anterior chest wall and parietal pericardium. They were occasionally large enough to impinge on the lung or diaphragm. The walls of the cysts were made up of fibrous connective tissue lined by a layer of flattened endothelial or mesothelial cells. Blades stated that an anomalous development of the pericardium probably explains their formation and that in the past certain of these cysts were classified as cystic hygromas or lymphangiomas. He recommended operation as the only means of establishing the nature of the lesion. Bradford et al. *(27)* reported 8 cases of pericardial celomic cysts. Because their source of material included that of Blades, it is probable that many or all of their cases were described by Blades. In one of the cases reported by Bradford et al., the cyst was lined by ciliated epithelium, making it doubtful that it should be included in this group.

Lam *(28)* described pericardial celomic cysts and subscribed to Lambert's ideas on the subject. He reported the case of a white woman, aged 39 years, who had complained of fever, shortness of breath, fatigue, and angina pectoris for 10 years. Roentgenograms led to the diagnosis of a large tumor overlying the heart. At operation a huge thin-walled cyst was found in the mediastinum anterior to the heart and great vessels. It projected around behind the heart on the right. During removal the cyst ruptured with the escape of 1,000 cc. of clear, straw-colored fluid. The pathologist reported a simple cyst without an epithelial lining. After operation, the patient's pain disappeared but the fever persisted.

Guibal et al. *(29)* reported a woman, 38 years old, with an asymptomatic pleuropericardial cyst which was diagnosed roentgenographically and successfully removed at operation. The cyst was orange-sized, located on the right just above the diaphragm, and was in juxtaposition to the pericardium. It was thin-walled, lined with endothelium, and the

(26) Blades, B.: Mediastinal tumors; report of cases treated at Army Thoracic Surgery Centers in United States. Ann. Surg. 123: 749-765, May 1946.

(27) Bradford, M. L.; Mahon, H. W.; and Grow, J. B.: Mediastinal cysts and tumors. Surg., Gynec. & Obst. 85: 467-491, Oct. 1947.

(28) Lam, C. R.: Pericardial celomic cysts. Radiology 48: 239-243, Mar. 1947.

(29) Guibal, J.; Raganeau; and Cattenoz: Kyste intra-thoracique, pleuro-péricardique. Exérèse. Guérison. Mém. Acad. de chir. 73: 350-353, May 14-21, 1947.

TABLE 2. *Pericardial cysts*

Author	Date	Number of patients	Age (years)	Sex	Symptoms	Location	Treatment
Boyer (cited by Hart *(17)*)	1837	1	–	–	–	–	None; found at autopsy
Atayas-Maraty *(18)*	1895	1	–	–	–	Anterior mediastinum	None; found at autopsy
Dufour and Mourrut *(16)*	1929	1	86	F	–	Anterior mediastinum	None; found at autopsy
Yater *(19)*	1931	1	52	M	Asymptomatic	To the left	None; found at autopsy
Pickhardt *(20)*	1934	1	53	F	Precordial pain	To the left	Excision—successful
Rizzi *(21)*	1935	1	53	M	–	Anterior and to the right	None; found at autopsy
Bartolozzi *(22)*	1936	1	80	F	–	To the right	None; found at autopsy
Churchill and Mallory *(23)*	1937	2	63 *	M *	Difficulty in swallowing *	Anterior and to the right *	Excision successful *
Weiss *(24)*	1939	1	36	M	Cardiac complaints	To the right	Excision—successful
Lambert *(9)*	1940	3	– –	– –	Asymptomatic Asymptomatic	Anterior and to the left Anterior and to the left	Excision—successful Excision—successful
Greenfield et al. *(25)*	1942	1	54	F	Asymptomatic	Anterior and to the left	Excision—successful
Blades *(26)*	1946	10	–	–	All asymptomatic	–	All excised successfully
			30	M	Epigastric fullness; dyspnea	To the right	Excision—successful
			45	M	Pain, left chest; dyspnea and cough	To the left	Excision—successful
			32	M	Asymptomatic	Anterior and to the right	Excision—successful
			27	M	Asymptomatic	To the right	Excision—successful

TABLE 2. *Pericardial cysts—Continued*

Author	Date	Number of patients	Age (years)	Sex	Symptoms	Location	Treatment
Bradford et al. *(27)*	1947	8	31	M	Pain in epigastrium and left upper abdomen	To the left	Excision—successful
			29	M	Asymptomatic	To the right	Excision—successful
			32	M	Asymptomatic	To the right	Excision—successful
			34	M	Asymptomatic	Anterior and to the right	Excision—successful
Lam *(28)*	1947	1	39	F	Angina pectoris	Anterior and to the right	Excision—successful
Guibal et al. *(29)*	1947	1	38	F	Asymptomatic	To the right	Excision—successful
**Curreri and Gale *(13)*	1949	2	Over 40	–	Asymptomatic	To the right	–
			Over 40	–	Asymptomatic	To the right	–
Schein *(30)*	1949	1	52	M	Asymptomatic	To the right	Excision—successful

*No data on this case.

**Curreri in a personal communication reported 2 more cases of asymptomatic, right-sided pericardial cysts found in adults over 50 years of age.

content was clear fluid. The authors stated that such lesions are probably congenital in origin and caused by faulty development of the celomic cavity in the zone of coalescence of pleura, pericardium, and peritoneum.

Curreri and Gale *(13)* stated that these cysts usually occur on the left side and on fluoroscopy transmit the cardiac pulsations. They suggested pneumothorax to demonstrate the pericardial attachment. They reported 2 cases of pericardial cysts and recommended surgical exploration of all such unilateral mediastinal tumors. Schein *(30)* reported a single case of cyst of the pericardium in a white man, aged 52 years, who was asymptomatic. The cyst was diagnosed roentgenographically and was successfully removed. It was attached to the right side of the pericardium by a pedicle. The cyst was thin-walled with the usual lining of mesothelial cells. These authors stressed the establishment of a diagnosis as the indication for operation. They mentioned that infection or malignant change in a pericardial cyst has never been reported.

In summarizing the subject of pericardial cysts it would be difficult to improve on the gross and microscopic pathologic pictures presented by Lambert. His theory as to the congenital origin of these lesions is quite plausible. His desire to differentiate these pericardial celomic cysts from other thin-walled, clear fluid-containing cysts of the mediastinum is commendable, even though it is not always possible. Table 2 summarizes the 37 reported cases of simple mediastinal cysts which we have classified as pericardial cysts, some with the reservations discussed above. In contrast to the group with cystic hygromas most patients with pericardial cysts were over 30 years of age and about half were women. In several, symptoms were present which might be attributed to the cyst but in very few was this relationship confirmed by the disappearance of the complaints after operation. In no case was death attributed to the cyst.

PERICARDIAL DIVERTICULUMS

Hart *(17)* was the first to report a pericardial diverticulum. This he found during an autopsy of an aged woman with generalized anasarca. The diverticulum appeared as a pyriform sac in the anterior portion of the mediastinum. Fluid could be expressed from the sac into the pericardium proper through a finger-sized orifice at the point of reflection of the pericardium onto the aorta. The wall of the sac was similar to that of the pericardium. The pleural cavity was obliterated by old and extensive adhesions and the heart was hypertrophied, in a state of "active aneurysm."

Bristowe *(31)* found a small, lobulated flaccid bag in front of the pericardium of a woman, 47 years old, who had come to postmortem ex-

(30) Schein, C. J.: Cyst of pericardium. Am. J. Surg. 78: 411-413, Sept. 1949.
(31) Bristowe, J. S.: Diverticulum from pericardium. Tr. Path. Soc. London 20: 101, 1869.

amination. The diverticulum was the size of a pigeon's egg with an oval orifice into the pericardium which measured one-third of an inch in its long diameter. The wall of the diverticulum was identical with that of the pericardium.

Seidler *(32)* examined an elderly man who had died of apoplexy. Associated with a hypertrophied and dilated heart and a pericardial effusion was a circumscribed outpouching of the pericardium about the size of a hen's egg. The author visualized the diverticulum as a herniation of the pericardial wall at a weak spot, which may have been congenital or inflammatory in nature, and which gave way to an increased intrapericardial pressure from the cardiac enlargement and pericardial effusion.

Schirmer *(33)* found two pericardial diverticulums at autopsy of a patient who had died of pulmonary tuberculosis. The heart was small, the walls of the diverticulums were similar in structure to the pericardium, and the author classified these lesions as congenital. Lauer *(34)* reported a single diverticulum of similar nature and again a congenital origin was suggested.

Grabowski *(35)* classified a diverticulum of the pericardium which he discovered at the postmortem examination of a woman 50 years of age as a pulsion diverticulum through a gummatous process in the pericardial wall. He divided pericardial diverticulums based on their probable cause into pulsion, traction, and congenital types. He included those reported by Bristowe, Schirmer, and Lauer in the latter group.

Neprjachin *(36)*, Ypsilanti *(37)*, and Rizzi *(21)* each reported one case of a true or congenital pericardial diverticulum. In every instance the wall of the diverticulum was similar to that of the pericardium and no accompanying lesion was present to explain the diverticulum on a pulsion, traction, or inflammatory basis. All three authors accepted the possibility that true diverticulums are developmental anomalies, but pointed out that this hypothesis is difficult to establish because these lesions have never been found in embryos or the newborn.

In the literature from 1935 to date we have been unable to find any additional reports of a true or congenital diverticulum, but dating back

---

(32) Seidler, E.: Ueber Perikarddivertikel. Wien. klin. Wchnschr. 34: 592-594, Dec. 8, 1921.

(33) Schirmer, O.: Ueber Perikarddivertikel. Centralbl. f. allg. Path. u. path. Anat. 34: 61, 1923-24.

(34) Lauer, W.: Zur Kasuistik der angeborenen Perikard-Divertikel. Centralbl. f. allg. Path. u. path. Anat. 36: 353, 1925.

(35) Grabowski, W.: Zur Kasuistik der Perikarddivertikel. Centralbl. f. allg. Path. u. path. Anat. 37: 388, 1926.

(36) Neprjachin, G. G.: Zur Frage über das perikardiale Divertikel. Centralbl. f. allg. Path. u. path. Anat. 39: 548, 1927.

(37) Ypsilanti, H. P.: Ueber einen Fall von echtem Perikarddivertikel. Centralbl. f. allg. Path. u. path. Anat. 50: 417-420, Feb. 20, 1931.

to the report of Kienböck and Weiss (38) a voluminous literature on the roentgenologic diagnosis of pericardial diverticulums has accumulated. This includes several case reports (39-45) and reviews (46-49). Of the 50 to 60 case reports collected by these authors, many were unconfirmed roentgenologic diagnoses. Of the cases in which the diagnosis was confirmed at operation or autopsy, few were true or congenital diverticulums. New cases of congenital diverticulums have not been reported since the earlier reports discussed above.

Pericardial diverticulums have been separately classified on an etiologic and on a structural basis. Many descriptive terms have been proposed among which are inflammatory diverticulums, loculated exudates, serosal hernias, traction diverticulums, pulsion diverticulums, true diverticulums, and congenital diverticulums. In a great many of the reported cases the diagnosis of a pericardial diverticulum has been made only on the basis of an unconfirmed roentgenologic study.

TABLE 3. *True or "congenital" pericardial diverticulums*

Author	Date	Number of patients	Age (years)	Sex	Location
Bristowe (31)	1868	1	47	F	Anterior
Schirmer (33)	1923	1	40	F	Posterior
Lauer (34)	1925	1	30	M	To the right
Neprjachin (36)	1927	1	52	M	To the right
Ypsilanti (37)	1931	1	34	M	To the right
Rizzi (21)	1935	1	–	–	To the right

Accepting as true or congenital diverticulums only those in whose walls both pericardial layers are represented and for which no other probable etiologic factor was demonstrated, 6 cases are summarized in table 3. We are forced to admit that the congenital nature of these

(38) Kienböch, R., and Weiss, K.: Ueber das entzündliche Perikard-Divertikel. Fortschr. a. d. Geb. d. Röntgenstrahlen 40: 389-418, Sept. 1929.

(39) Freedman, E.: Inflammatory diverticula of pericardium (encapsulated pericardial effusion). Am. J. Roentgenol. 37: 733-738, June 1937.

(40) Arrillaga, F. C.; Donovan, C.; and Taquini, A. C.: Diverticulo del pericardio. Rev. argent. de cardiol. 5: 49-56, Mar-Apr. 1938.

(41) Paisseau, G., and Weill, J.: Diverticule du péricarde. Bull. et mém. Soc. méd. d. hôp. de Paris 54: 1319-1323, July 18, 1938.

(42) Voluter-de Loriol, G.: Etat actuel des données radiologiques dans le diagnostic différentiel des diverticules du péricarde. J. de radiol. et d'electrol. 25: 165-168, 1942-1943.

(43) Spühler, O.: Zur Differentialdiagnose der Perikarddivertikel und Cysten. Cardiologia 8: 225, 1944.

(44) Volpi, J. P., and Olascoaga, M. L.: Diverticulo del pericardio. Rev. san. mil., Buenos Aires 44: 708-716, May 1945.

lesions has not been established. We are willing to accept the possibility suggested by Lambert that they are caused by inequality in the rate of development of one of the lacunas which later form the pericardial celom. In contrast to the cystic hygroma group all of these patients were over 30 years of age. Symptoms attributable to the diverticulum were not recorded for any of them. In all cases the diagnosis was made at postmortem examination, and in 4 death was caused by tuberculosis.

CASE REPORT

A man, 27 years old, was admitted to the U. S. Naval Hospital, Philadelphia, Pa., on 25 March 1949 for evaluation of a compensation claim relating to a head injury suffered while in the Army. His complaints were attacks of dizziness associated with loss of consciousness. Physical and laboratory findings were essentially normal. Roentgenograms of the chest showed an oval shadow, about 2 inches wide, at the lower right border of the cardiac silhouette. The mass was well visualized in the left oblique view and appeared to be located anteriorly, adjacent to the right ventricle (fig. 1). On fluoroscopy there was a slight pulsation of the mass, apparently a transmitted cardiac pulsation. The abnormal shadow seemed to change slightly in contour with respiration. The roentgenologist (R. D.) thought that the findings were suggestive of a pericardial cyst.

The patient was seen by a neuropsychiatric consultant who believed that it was unlikely that the dizziness and unconsciousness had an organic basis. No attack was observed while the patient was being studied. A surgical consultant (R. B.) was then asked to see the patient in regard to the asymptomatic intrathoracic lesion, and an exploratory thoracotomy was advised. This was performed on 22 April. Intratracheal nitrous oxide-ether anesthesia was used. The right hemithorax was entered through the bed of the resected seventh rib by a posterolateral approach. The cyst, which measured 2½ by 3½ inches, presented from the anterolateral aspect of the pericardium and was readily exposed by retraction of the right middle and lower pulmonary lobes. It was thin-walled, multiloculated, and translucent (fig. 2A).

The mediastinal pleura was incised and separation of the cyst from the pericardium was accomplished with ease except over a central area where the attachment was intimate. Clear, straw-colored fluid escaped, partially evacuating the cyst when its wall was incised by sharp dis-

(45) Aubert M., and Kulaflieff, P.: Un cas de diverticule du Péricarde. J. de. radiol. et d'électrol. 27: 553, 1946.

(46) Cushing, E. H.: Diverticulum of pericardium. Arch. Int. Med. 59: 56-64, Jan. 1937.

(47) Reitan, H.: Beitrag zur Röntgendiagnose der Perikard-divertikel und der abgesackten Perikardexsudate. Fortschr. a. d. Geb. d. Röntgenstrahlen 58: 195-213, Sept. 1938.

(48) Eschbach, H.: Das chronisch-entzündliche Perikarddivertikel. Deutsche med. Wchnschr. 65: 840, May 1939.

(49) Fossati, F., and Cossali, C.: Diverticoli e cisti del pericardio; rassegna critica e studio clinico-radiologica. Arch. di pat. e clin. med. 20: 383-433, Feb. 1940.

Figure 1. Preoperative views of the chest showing a mass extending anteriorly and laterally from the lower right border of the cardiac silhouette. (A) Posteroanterior view. (B) Oblique view.

section in this region. Cystectomy was subsequently completed by excising the adherent pericardium along with the cyst. The small opening which had connected the pericardial sac with one of the loculations in the cyst could be seen (fig. 2B). Convalescence was uneventful and the patient was discharged from the hospital on 5 May.

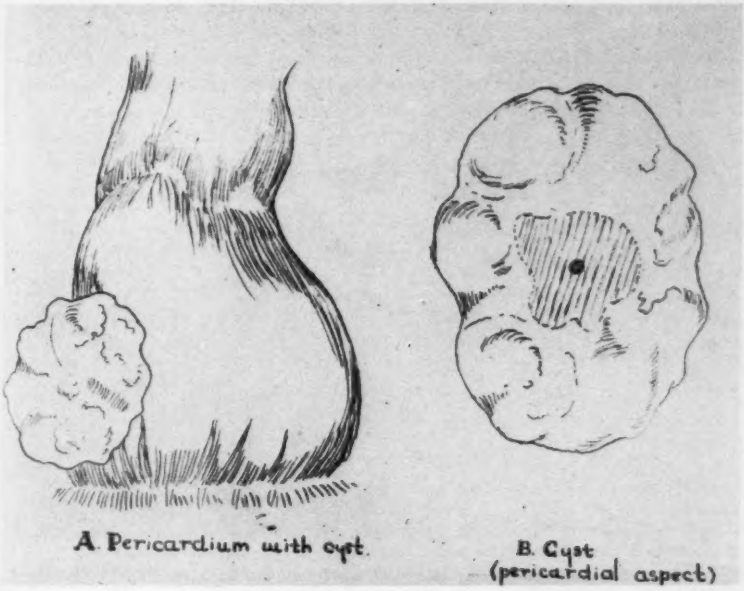


Figure 2. **(A)** ***A sketch to illustrate the general appearance, relative size, and relationship of the cyst to the pericardial sac.*** **(B)** ***The pericardial aspect of the cyst. The shaded area represents the piece of adherent pericardium excised. At its center is shown the small opening of communication between the pericardial sac and the cyst.***

For the most part the microscopic sections showed no cyst wall lining. In areas where the lining was present the cells varied from flat to low cuboidal with dark staining nuclei (fig. 3). These cells were of the endothelial type. The cyst wall varied in thickness and was composed of dense connective tissue which contained occasional adult fat cells, collections of lymphocytes, and congested blood vessels. The outer surface of the wall showed a thin covering of fatty and loose connective tissue. The pathologist's diagnosis was "serous cyst of the pericardium."

DISCUSSION

From a purely academic standpoint there is a great deal to be said for attempting a rigid classification of these simple cystic tumors of the mediastinum. Our own case adds to the impression gathered from

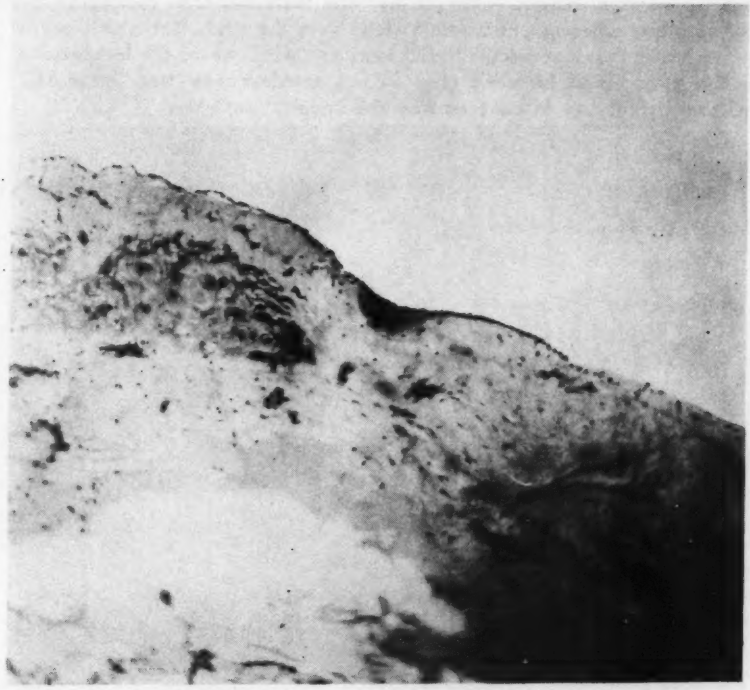


Figure 3. A photomicrograph of the cyst wall focused to show the cells lining the cyst wall.

a review of the literature that this is not always possible even when all the clinical, roentgenologic, and pathologic data are reviewed. A fair case can be made for placing the cystic tumor found by us in any one of the three classifications under discussion. The cyst was thin-walled, multilocular, and contained clear, straw-colored fluid. No sharp line of cleavage could be demonstrated over a sizeable area of its attachment to the pericardium. These features and the microscopic findings are compatible with a diagnosis of mediastinal cystic hygroma.

On the other hand the intimate association of the cyst with the pericardium (and the pericardium alone) to the point of communication of one small loculation with the pericardial sac cannot be ignored. In this sense the communicating loculation should be considered a pericardial diverticulum and the closed loculations, pericardial cysts. Perhaps it would be better to settle for a descriptive term and classify this lesion as a multiloculated, cystic tumor of the mediastinum communicating with the pericardial sac. The question might be raised whether this is the exception that proves the rule or whether this case

casts some doubt on the justification for separating mediastinal cystic hygromas and pericardial cysts on a structural or embryologic basis.

From a clinical standpoint the distinction between these lesions is not essential. They cannot be differentiated on the basis of symptoms or roentgen examination. Even more important, these benign lesions cannot be differentiated from malignant tumors and other masses of the mediastinum. The possibility of a malignant tumor constitutes the strongest argument for their surgical removal. In addition they may enlarge to produce distressing pressure symptoms *(6, 20, 28)* and in at least one instance infection in the mediastinal portion of a combined cervicomediastinal lymphangioma has resulted in death *(50)*. At least 5 mediastinal hygromas and 20 pericardial cysts have been successfully resected.

(50) Singleton, A. O.: Congenital lymphatic diseases—lymphangiomata. Ann. Surg. 105: 952-968, June 1937.

BOOK REVIEW

Tobacco and the Cardiovascular System, The Effects of Smoking and of Nicotine on Normal Persons, by *Grace M. Roth,* Ph. D., Associate Professor of Experimental Medicine, Mayo Foundation for Medical Education and Research, Graduate School, University of Minnesota, and Consultant in Section on Physiology, Mayo Clinic, Rochester, Minn. Publication Number 100, American Lecture Series. A Monograph in American Lectures in Circulation. Edited by *Irvine H. Page,* M. D., Cleveland Clinic, Cleveland, Ohio, and *A. C. Corcoran,* M. D., Cleveland Clinic, Cleveland, Ohio. 66 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1951. Price $2.25.

This brief, well-written monograph is by one of the foremost authorities on the physiologic effects of tobacco smoking. The subject is presented as a compendium based on research data of the author and others, adequately documented and clearly stated. The subject is approached via a background of general aspects, physiologic factors, experimental methods and considerations, then concluded by a series of questions answered by experimental data. The principal conclusion reached is "that the smoking of tobacco is most likely a contributory factor and not a primarily etiologic one in the production of cardiovascular disease." Because of the many facets considered, this is an excellent source book and one to be consulted before discussion of this somewhat controversial subject.

—*Col. C. L. Leedham, MC, U. S. A.*

971621 O - 51 - 6

BOOK REVIEW

The Quantitation of Mixtures of Hemoglobin Derivatives by Photoelectric Spectrophotometry, by *Francis T. Hunter,* A. M., M. D., Associate in Medicine, Harvard Medical School; Associate Physician and Clinical Pathologist, Massachusetts General Hospital, Boston, Mass. 226 pages; illustrated. Charles C Thomas Publisher, Springfield, Ill., 1951. Price $8.50.

This handbook is a study of the use of spectrophotometric measurements at carefully selected wave lengths for the quantitative determination of various blood pigments. The author emphasizes the importance of using narrow wave bands in the visible spectrum, requiring a minimum number of chemical procedures and employing colorless reagents in clear solutions.

Part I is a discussion of the general principles of spectrophotometry. The mathematical theory makes use of the Bouguer-Beer Law to show that the density of a mixture is a function of concentration which in turn is percent transmission, $D = f(C) = \%T$. The derivation of a general formula containing 2 and 3 mixtures is given. Part II outlines spectrophotometric procedures for determining the various pigments including oxyhemoglobin, carbon monoxide hemoglobin, methemoglobin, bilirubin, et cetera, together with a description of a device for diluting small amounts of blood under air-free conditions so that photometric determination of oxygen saturation is possible. The last portion of the book is composed of 4 appendexes which include numerous calibration curves, nomograms, and detailed absorption spectra in the visible region for various blood pigments and derivatives.

This is definitely a book for the specialist. The analytical procedures themselves are relatively simple but the theoretical treatment is not one which the average laboratory technician will understand. The book will be of more value to the research scientist whose main interest is in the field of blood pigment measurement than to the clinical laboratory technician.—*Col. M. W. Bayliss, MC, U. S. A.*

Multiple Eosinophilic Granuloma of Bone With Pulmonary Involvement

Arnold J. Brody, *Captain, MC, U. S. A.* (1)

James O. Gillespie, *Brigadier General, MC, U. S. A.* (1)

EOSINOPHILIC granuloma is a term that was first used by Lichtenstein and Jaffe (2) in 1940 to describe what was thought to be a localized condition of bone containing large numbers of eosinophilic granulocytes and giving rise to areas of cystic rarefaction. Earlier in the same year Otani and Ehrlich (3) had reported a similar lesion as a solitary granuloma of bone. Finzi (4) in 1939 probably reported the same disease when he described a myeloma with prevalence of eosinophilic cells in the frontal bone of a 15-year-old boy. Apparently eosinophilic granuloma of bone is also the same disease described in 1938 by Schairer (5) as osteomyelitis with eosinophilic reaction. Since Lichtenstein and Jaffe's description of eosinophilic granuloma as a new disease entity, there has been an increasing number of cases, now totaling over 90, reported.

ETIOLOGY AND PATHOLOGY

The cause of eosinophilic granuloma is unknown. Trauma has been considered significant by some but proof of a causal relationship is lacking. Cultures and other bacterial studies have failed to reveal an infectious agent. Most authors now believe that eosinophilic granuloma is related to Letterer-Siwe and Hand-Schüller-Christian diseases in that all three are different expressions of the same basic disorder.

(1) Letterman Army Hospital, San Francisco, Calif.

(2) Lichtenstein, L., and Jaffe, H. L.: Eosinophilic granuloma of bone, with report of case. Am. J. Path. 16: 595-604, Sept. 1940.

(3) Otani, S., and Ehrlich, J. C.: Solitary granuloma of bone simulating primary neoplasm. Am. J. Path. 16: 479-490, July 1940.

(4) Finzi, O.: Mieloma con prevalenza delle cellule eosinofile, circoscritto all'osso frontale in un giovane di 15 anni. Minerva Med. (pt. 1) 9: 239-241, Feb. 17, 1929.

(5) Schairer, E.: Ueber eine eignartige Erkrankung des kindlichen Schädels (Osteomyelitis mit eosinophiler Reaktion). Zentralbl. f. allg. Path. u. path. Anat. 71: 113-117, Nov. 22, 1938.

These diseases once were considered to be caused primarily by faulty lipid metabolism, but are now generally thought to be disorders of the reticuloendothelial system.

Fraser (6) reported 4 cases of Hand-Schüller-Christian disease under the name of skeletal lipoid granulomatosis and described the pathologic changes as taking place in three stages: endothelial cell proliferation, eosinophilic infiltration, and lipoid storage. Later Farber (7) and Green and Farber (8) pointed out that anatomically the lesion of eosinophilic granuloma is related to both Hand-Schüller-Christian and Letterer-Siwe diseases and was but one phase of the progression that developed into the above diseases. In the early stages the lesion consists of a histiocytic granuloma frequently dominated by eosinophils and in the later stages the large mononuclear cells may become lipophages, taking on a typical appearance of foam cells, while the eosinophils disappear. They presented cases illustrating transition from what has been described as typical eosinophilic granuloma of bone to the clinical triad of exophthalmos, lesions of the cranial fossa and diabetes insipidus. Mallory (9) also concluded that the three diseases were related. In infancy the disease is manifested by widespread monocytic and clasmatocytic proliferations as the rapidly fatal Letterer-Siwe's disease; later in childhood as the more chronic Hand-Schüller-Christian disease characterized by lipoid degeneration histologically; and in older children and adults as the benign eosinophilic granuloma in which the histologic lesion is granulomatous with marked accumulation of mononuclear phagocytes, often many foreign body giant cells and variable (often great) numbers of eosinophils. A clinical and morphologic transition from eosinophilic granuloma to Hand-Schüller-Christian disease was also observed by Engelbreth-Holm et al. (10) and they concluded that eosinophilic granuloma should no longer be maintained as a separate entity but should be considered as a clinical monosymptomatic form of Hand-Schüller-Christian disease that often heals without becoming generalized.

Jaffe and Lichtenstein (11) conceded that eosinophilic granuloma, Letterer-Siwe, and Hand-Schüller-Christian diseases may be consid-

(6) Fraser, J.: Skeletal lipoid granulomatosis (Hand-Schüller-Christian's disease). Brit. J. Surg. 22: 800-824, Apr. 1935.

(7) Farber, S.: Nature of "solitary or eosinophilic granuloma" of bone. Am. J. Path. 17: 625-629, July 1941.

(8) Green, W. T., and Farber, S.: "Eosinophilic or solitary granuloma" of bone. J. Bone & Joint Surg. 24: 499-526, July 1942.

(9) Mallory, T. B.: Medical Progress. Pathology: Diseases of bone. New England J. Med. 227: 955-956, Dec. 17, 1942.

(10) Engelbreth-Holm, J.; Teilum, G.; and Christensen, E.: Eosinophilic granuloma of bone—Schüller-Christian's disease. Acta med. Scandinav. 118: 292-312, 1944.

(11) Jaffe, H. L., and Lichtenstein, L.: Eosinophilic granuloma of bone; condition affecting one, several, or many bones, but apparently limited to skeleton, and representing mildest clinical expression of peculiar inflammatory histiocytosis also underlying Letterer-Siwe disease and Schüller-Christian disease. Arch. Path. 37: 99-118, Feb. 1944.

ered as different clinical anatomic expressions of the same basic disorder but stated that the lesions in eosinophilic granuloma are given a distinct cytologic imprint by the abundance of eosinophils and usually do not tend to undergo collagenization and lipidization. The typical early lesion of eosinophilic granuloma of bone was described as appearing grossly to consist of hemorrhagic cystic areas with brownish granulation tissue and microscopically as a sheetlike collection of large phagocytic cells, interspersed among which are varying numbers of eosinophilic leukocytes and occasional phagocytic multinuclear giant cells. Jaffe and Lichtenstein stressed the benign character of eosinophilic granuloma and believed that the term should be retained to emphasize the clinical difference between it and Hand-Schüller-Christian disease.

CLINICAL FEATURES

Most of the patients reported in the literature have been male. The vast majority of cases occur in young adults and children and although it is considered extremely rare in adults over the age of 40, Parkinson *(12)* reported a case in a 56-year-old man and Versiani et al. *(13)* reported a case in a 50-year-old woman. The lesion of bone may be solitary or multiple. Dundon et al. *(14)* in reviewing the literature up to 1946 found that of 53 cases reported, 36 were solitary, 10 multiple, and 7 uncertain. The bones most frequently involved are the skull, ribs, vertebras, humerus, and femur. Any bone may be affected but there are no reports in the literature of involvement of the hands or feet. The presenting signs of bony involvement may be pain and swelling. Usually there are no systemic symptoms, but low-grade fever and weight loss may occur *(15)*. Organs other than bones have been involved. Cases with cutaneous lesions histologically similar to the bone lesions have been reported *(16, 17)*. A case has been reported in which eosinophilic granuloma of the mandible was associated with similar granulomas of the gum and palate *(18)*. Lesions in the vertebras and the skull have led to

(12) Parkinson, T.: Eosinophilic xanthomatous granuloma with honeycomb lungs. Brit. Med. J. 1: 1029-1030, June 11, 1949.

(13) Versiani, O.; Figueiro, J. M.; and Junqueira, M. A.: Hand-Schüller-Christian's syndrome and "eosinophilic or solitary granuloma of bone." Am. J. M. Sc. 207: 161-166, Feb. 1944.

(14) Dundon, C. C.; Williams, H. A.; and Laipply, T. C.: Eosinophilic granuloma of bone. Radiology 47: 433-444, Nov. 1946.

(15) Solomon, H. A., and Schwartz, S.: Eosinophilic granuloma of bone. J. A. M. A. 128: 729-731, July 7, 1945.

(16) Lever, W. F., and Leeper, R. W.: Eosinophilic granuloma of skin; report of cases representing the two different diseases described as eosinophilic granuloma. Arch. Dermat. & Syph. 62: 85-96, July 1950.

(17) Curtis, A. C. (Ann Arbor, Mich.), and Cawly, E. P.: Eosinophilic granuloma of bone with cutaneous manifestations; report of case. Arch. Dermat. & Syph. 55: 810-818, June 1947.

(18) Schroff, J.: Eosinophilic granuloma of bone; case report of eosinophilic granuloma of mouth (jaws, gum, and palate) with simultaneous fistula in ano. Oral Surg., Oral Med., & Oral Path. 1: 256-264, Mar. 1948.

various neurologic manifestations *(19,20)*. Diabetes insipidus complicating eosinophilic granuloma of bone has been reported *(12,21-25)*. Although it is considered unusual there have been several cases reported in the literature of eosinophilic granuloma with pulmonary involvement *(10,12,21-32)*.

ROENTGENOLOGIC FEATURES

Radiologically the bones involved show rarefied areas of varying sizes that may be irregular, round, or oval. The cortex may become eroded with resultant development of pathologic fractures and new bone formation. Serial roentgenograms may show rapid progression *(33)*. Sclerosis of the margins of the lesion and periosteal thickening of long bones have been noted *(14)*. There is no osteoporosis of surrounding bone. If the lungs are involved, roentgenograms of the chest usually show a soft, nodular infiltration throughout parts of one or both lungs as noted in the discussion of lung involvement in this paper.

---

(19) Osborne, R. L.; Freis, E. D.; and Levin, A. G.: Eosinophilic granuloma of bone presenting neurologic signs and symptoms; report of case. Arch. Neurol. & Psychiat. 51: 452-456, May 1944.

(20) Michael, P., and Norcross, N. C.: Eosinophilic granuloma of bone. U. S. Nav. M. Bull. 45: 661-668, Oct. 1945.

(21) Ackerman, A. J.: Eosinophilic granuloma of bone associated with involvement of lungs and diaphragm. Am. J. Roentgenol. 58: 733-740, Dec. 1947.

(22) Lewis, G. M.: Eosinophilic granuloma of pituitary gland, lungs, bones of the skull and skin. Arch. Dermat. & Syph. 60: 1007-1008, Nov. 1949.

(23) Troxler, E. R., and Niemetz, D.: Generalized xanthomatosis with pulmonary, skeletal, and cerebral manifestations; report of case. Ann. Int. Med. 25: 960-968, Dec. 1946.

(24) Ponseti, I.: Bone lesions in eosinophilic granuloma, Hand-Schüller-Christian disease, and Letterer-Siwe disease. J. Bone & Joint Surg. 30: 811-833, Oct. 1948.

(25) Currens, J. H., and Popp, W. C.: Xanthomatosis—Hand-Schüller-Christian type; report of case with pulmonary fibrosis. Am. J. M. Sc. 205: 780-785, June 1943.

(26) Imler, A. E.: Reticulo-endotheliosis with report of 2 cases. Am. J. Roentgenol. 56: 343-354, Sept. 1946.

(27) Weinstein, A.; Francis, H. C.; and Sprofkin, B. F.: Eosinophilic granuloma of bone; report of case with multiple lesions of bone and pulmonary infiltration. Arch. Int. Med. 79: 176-184, Feb. 1947.

(28) Dickson, D. D.: Eosinophilic granuloma of bone with diffuse pulmonary involvement. California Med. 69: 51-53, July 1948.

(29) Straus, B.: Metabolic and inflammatory histiocytosis, with case reports of Gaucher's disease, Letterer-Siwe's disease and eosinophilic granuloma. Am. J. Med. 5: 245-251, Aug. 1948.

(30) Arnold, H. L.: Eosinophilic granuloma of bone; preliminary report of case complicated by lung lesions. Proc. Staff Meet. Clin., Honolulu. 12: 183-185, Sept. 1946.

(31) Zinneman, H. H.: Eosinophilic granuloma of bone. Am. Pract. 2: 121-124, Oct. 1947.

(32) Snapper, I.: Medical Clinics on Bone Diseases. 2d edition. Interscience Publishers, Inc., New York, N. Y., 1949. pp. 192-195.

(33) Baker, W. J. (West Roxbury, Mass.); Houghton, J. D.; Wissing, E.; and Betts, R. H.: Eosinophilic granuloma; report of case with x-ray evidence of rapid progression. New England J. Med. 238: 626-629, Apr. 29, 1948.

LABORATORY DATA

Laboratory examinations are apparently of no help in making a diagnosis. A leukocytosis and eosinophilia have been noted, but in most cases the white blood cell count is within normal limits. Also there is usually no anemia. Blood chemistry determinations, including calcium, phosphorus, phosphatase, cholesterol, and blood lipids, have been consistently within normal limits.

THERAPY AND PROGNOSIS

Healing of bone lesions usually occurs after surgical excision, curettage, or small amounts of irradiation, but some have been known to heal spontaneously. Because the roentgenographic appearance of eosinophilic granuloma of bone may be indistinguishable from that of other conditions, such as multiple myeloma, malignancy, osteomyelitis, and giant-cell tumor, a biopsy is indicated before therapy is started. It is considered by most authors that the disease is limited, usually showing complete recovery in a few months to a year, but in cases with more widespread involvement, as the one presented here, the prognosis should be more guarded.

The following case is of special interest for two reasons. There is roentgenographic evidence of extensive pulmonary involvement and the patient was apparently made worse by ACTH therapy.

CASE REPORT

A 24-year-old, white soldier developed several loose mandibular teeth while stationed in the Philippines in 1946. These were extracted but he was not told why they became loose and no further investigation was made. He then had no trouble until October 1949, when he noted a dull, throbbing ache over the left hip while lying quietly in bed. The pain subsided after 3 or 4 nights and the patient remained asymptomatic until October 1950, at which time the pain recurred in the same manner as before. The degree and quality of the pain was the same but subsequently it occurred more often and was frequently precipitated by stepping down in the left foot suddenly or by twisting the left leg. In the latter part of October the patient had a routine dental examination and it was noticed that there was an abnormal recession of the alveolar ridges. A roentgenogram of the mandible revealed a large osteolytic lesion involving the symphysis. A bone survey revealed osteolytic lesions involving the pelvis and right lesser trochanter. The patient was then transferred to a general hospital for diagnosis and treatment.

Physical examination revealed marked atrophy of the alveolar ridges of the mandible bilaterally and the teeth were absent in these areas. The mucosa of the mouth was intact. A slightly enlarged lymph node of

normal consistency was palpable in the right axilla. There was a dull, deep pain in the area above the left acetabulum with abduction and external rotation of the left leg and there was some limitation of abduction.

With the exception of a positive tuberculin skin test with second strength PPD the findings were within normal limits. A roentgenogram revealed atrophy of the horizontal portion of the mandible on each side and a marked degree of bone destruction along the alveolar ridges (fig. 1). There was a large area of bone destruction in the left ilium in the area immediately above the acetabulum with destruction of the lateral cortex (fig. 2). The area was surrounded by sclerotic bone. The roentgenogram of the right femur revealed areas of rarefaction in the lesser trochanter (fig. 3). There was marked concavity of both superior and inferior surfaces of the bodies of the third, fourth, and fifth lumbar vertebras (fig. 4). A roentgenogram of the chest revealed a diffuse mottled, fine infiltration throughout both lungs with numerous hilar and parahilar circumscribed calcific densities believed to be residual from old inflammatory disease and not related to present illness (fig. 5).

A biopsy specimen from the mandibular lesion revealed tan-gray, hemorrhagic, friable tissue. Microscopically this was composed primarily of connective tissue elements (fig. 6 and 7). The predominant cell was large and mononuclear with finely granular and acidophilic cytoplasm. There were also scattered plasma cells and occasional giant cells of the Langhans type. Scattered throughout this background of cells were many eosinophils. A few areas of hemorrhagic necrosis were present. A diagnosis of eosinophilic granuloma of the mandible was made.

On 16 December treatment with 50 mg. of ACTH intramuscularly every 6 hours was started. On the second day of this therapy, after the patient had received a total of 300 mg. of ACTH, he developed a low backache which increased in severity. Within 2 hours the pain was so severe he had to remain in bed. Any movement of the trunk, legs, or toes, accentuated the pain. Examination revealed tenderness over the fourth and fifth lumbar vertebras and a moderate amount of spasm of the lower lumbar muscles. At the same time the patient began having a daily rise in temperature from 100° to 102° F. A roentgenogram of the lumbar spine revealed no change. Blood cultures and urine cultures were sterile. A stool culture was negative for enteric pathogens. On 18 December the patient also began having pain in the left hip of moderate severity. On that date the ACTH was decreased to 25 mg. every 6 hours and, because the extreme pain and daily temperature elevation continued, the ACTH was discontinued on 20 December after a total of 600 mg. had been given.

A course of penicillin was then given, but the patient continued to be febrile and to have severe back and hip pain. On 27 December x-ray therapy over the lumbar spine was begun and the patient was given a

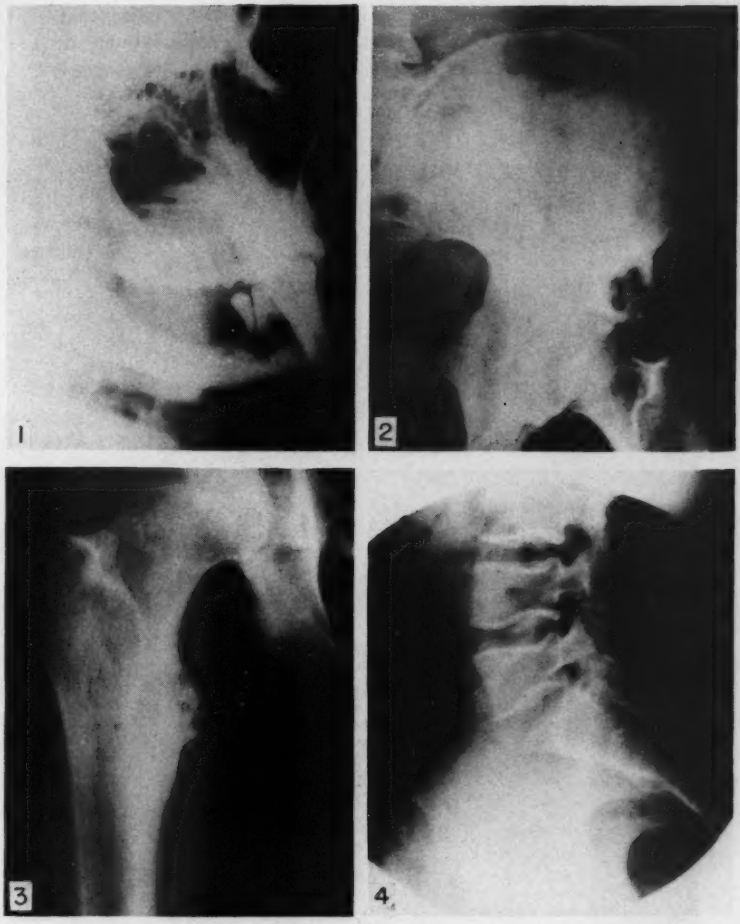


Figure 1. Roentgenogram showing destruction in the mandible. Figure 2. Roentgenogram showing destruction in the lateral cortex of the left ilium. Figure 3. Roentgenogram showing areas of rarefaction in the lesser trochanter. Figure 4. Roentgenogram showing marked concavity of surfaces of lumbar vertebras.

total of 1,000 r. over a period of 10 days. Shortly after this therapy was instituted, the lumbar pain decreased slightly in severity and the temperature returned to normal, but the pain continued to be severe enough to prevent ambulation. On 2 January 1951 irradiation of the left hip was started and a total of 1,130 r. was given over an 8-day period. Following this course of therapy there was complete relief of the hip pain and the

patient had no trouble in moving his left lower extremity. At the conclusion of the x-ray therapy the patient began to have persistent low-grade fever varying between 99° and 100° F. Roentgenograms of the hip, mandible, chest, and lumbar spine taken a month later revealed no change. The patient still had moderate low back pain, a low-grade fever, and was not ambulatory. In the latter part of February irradiation of the

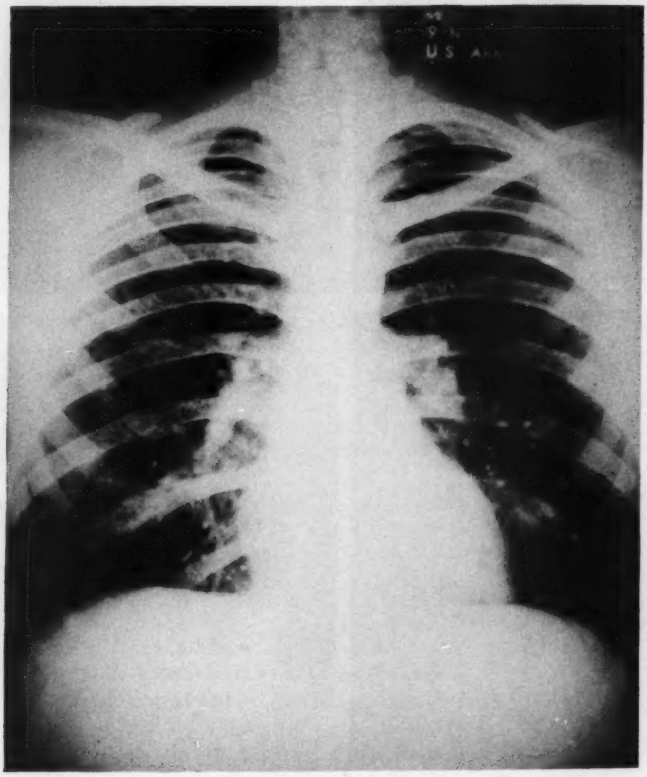


Figure 5. Roentgenogram showing infiltration and circumscribed calcific densities throughout both lungs.

mandibular area was begun and a total of 500 r. was given over each mandible. The patient continued to show little improvement until the latter part of March when he became ambulatory with the aid of a back brace and a cane.

Roentgenograms of the bony lesions and chest in June revealed no significant changes, and at that time the patient still had a low-grade intermittent fever and ambulation was difficult because of pain in the back and left hip.

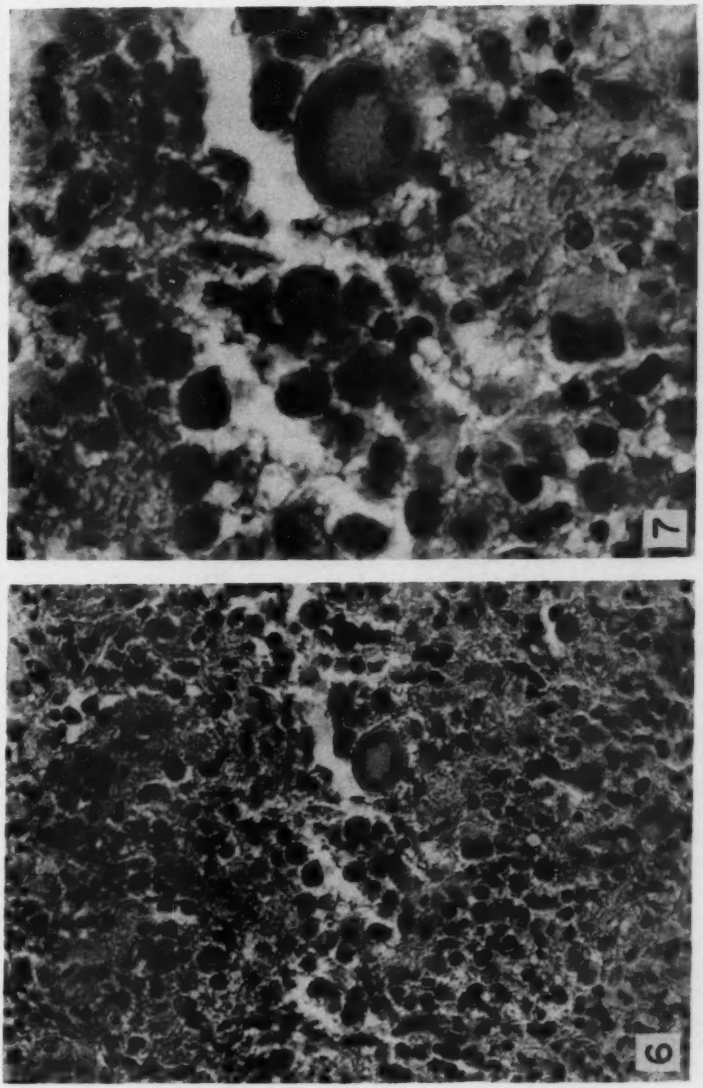


Figure 6. Section of tissue from mandibular lesion. Figure 7. Same section as figure 6 with higher magnification.

COMMENT

This patient developed fever, severe debilitating back pain, and an exacerbation of the hip pain while on ACTH therapy. Before therapy was started, roentgenograms showed concavity of the lumbar vertebral bodies suggestive of osteoporosis. Possibly the catabolic effect of ACTH on protein further depleted an already deficient osseous protein matrix in the lumbar vertebras, causing severe back pain. The exacerbation of pain in the hip also suggested that ACTH had an adverse effect on the lesions of eosinophilic granuloma. Another interesting aspect of this case was the prolonged low-grade fever and disability which threw doubt on the much emphasized benignancy of this disease.

The pulmonary findings in this patient were unusual, but apparently not as rare as formerly thought. In January 1951, 16 cases (including the case here reported) that could be pathologically classified as eosinophilic granuloma of bone with pulmonary involvement had been reported *(10,12,21-32)*. Six *(12,21-25)* of these had diabetes insipidus, which is generally associated with Hand-Schüller-Christian disease, but all had the typical bony lesion of eosinophilic granuloma, with large numbers of eosinophils. Three of these had moderate amounts of lipoid in the lesion from which a specimen was taken and 3 had no demonstrable lipoid. Another case *(10)* that occurred in a 5-year-old boy developed diabetes insipidus within a year after the bony lesion and pulmonary involvement were discovered. A biopsy specimen in this case also revealed typical eosinophilic granuloma of bone.

In 12 cases the roentgenogram of the chest showed a diffuse miliary infiltration or mottling throughout both lungs. This type of roentgenogram was also described as showing honeycombing and generalized reticulation or accentuation of the reticular pattern. One patient with this pattern had partial pulmonary involvement but in the rest both lungs were involved throughout. Roentgenograms of the chest of the other 4 patients reported were described as showing soft infiltration in both lung fields *(26)*, diffuse pulmonary fibrosis *(25)*, and fibrosis of the dorsal segment of the left lower lobe *(21)*. Most patients had no symptoms referable to the lungs. One had a dry cough *(27)*; 1 had only shortness of breath *(12)*; and a spontaneous pneumothorax occurred in 2 *(23,32)*. None of the patients developed progressive or permanently debilitating pulmonary symptoms. Twelve had multiple bony involvement: 3 had solitary lesions, and the report of 1 made no mention of the number of bony lesions. This represents a much higher percent of multiple bone involvement than in the group of patients without pulmonary involvement reviewed by Dundon et al. *(14)*. Nine of the patients reported received pulmonary irradiation. In 3 of these *(26,27,30)* marked clearing resulted; 1 had slight clearing *(25)*, and the rest had no demonstrable improvement. The patients who were apparently irradiated early in the disease responded best. Two *(24,31)* cleared completely without treatment of any kind.

Because none of the patients with eosinophilic granuloma and pulmonary involvement died, the exact nature of the pathologic changes in the lungs are unknown, but it seems logical to assume that the lesions are similar to those that occur in Letterer-Siwe disease and Hand-Schüller-Christian disease. Schafer *(34)* reported a 19-week-old infant with Letterer-Siwe disease who had a roentgenogram of the chest showing a fine honeycombing of the entire lung similar to that of the patient here reported. At autopsy there was widespread involvement of many organs. Grossly the air spaces of the lungs were flanked by thickened septums with mottled, yellow color, giving them a "honeycomb" appearance. Microscopically the alveolar walls were found to be thickened because of an increase of cellular constituents consisting of atypical mononuclear cells, an occasional giant cell containing sudantropic droplets and a few lymphocytes and eosinophils. As early as 1928 Rowland *(35)* described a fatal case of Hand-Schüller-Christian disease with pulmonary involvement. An autopsy revealed the lungs to be grossly a mass of pea-sized communicating vesicular cavities. The septums between the cavities were fibrous and elastic. Microscopically the reticuloendothelial cells around the pulmonary vessels showed hyperplasia and lipoidosis and projecting into the large bronchi were papillary overgrowths of fibroplastic tissue and reticuloendothelial cells showing lipoidosis.

Even though the above 2 cases and eosinophilic granuloma of bone with pulmonary involvement are vastly different clinically, the gross pathologic descriptions of the lungs parallel the described honeycombing or reticular mottling of the chest films in eosinophilic granuloma.

CONCLUSIONS

A patient with eosinophilic granuloma showing multiple bony and pulmonary involvement was apparently made worse by ACTH therapy. Typically the radiologic findings in the lungs may be described as a diffuse miliary infiltration or mottling usually involving both lungs. Usually there are no symptoms referable to the pulmonary involvement, but cough, dyspnea, and spontaneous pneumothorax may occur. Patients with pulmonary involvement are more likely to have multiple than solitary bone lesions. The pulmonary lesions are more likely to respond to x-ray therapy if it is given early in the course of the disease. The exact nature of the pathologic changes in the pulmonary lesions is unknown, but it seems logical to attribute the roentgenographic findings to proliferation of reticuloendothelial cells in the alveolar septums. Because pulmonary involvement in eosinophilic granuloma of bone is not as rare as formerly thought, it may be necessary to include in the

(34) Schafer, E. L.: Nonlipid reticulo-endotheliosis; Letterer-Siwe's disease report of 3 cases. Am. J. Path. 25: 49-83, Jan. 1949.

(35) Rowland, R. S.: Xanthomatosis and reticulo-endothelial system; correlation of unidentified group of cases described as defects in membranous bones, exophthalmos and diabetes insipidus (Christian's syndrome). Arch. Int. Med. 42: 611-674, Nov. 1928.

differential diagnosis diseases that may effect both lungs and bones such as Boeck's sarcoid, fungus disease, malignancies with bony involvement and lymphangitic pulmonary spread, and tuberculosis. A review of the literature further emphasizes the close relationship of eosinophilic granuloma and Hand-Schüller-Christian disease, but until a definite cause is established the variable clinical findings and morphology of this disease will probably perpetuate the separate classification.

BOOK REVIEW

The Physiology of the Newborn Infant, by *Clement A. Smith,* M. D. Associate Professor of Pediatrics, Boston Lying-In Hospital, Harvard Medical School. 365 pages; 52 illustrations. Charles C Thomas, Publisher, Springfield, Ill., 1951. Price $7.50.

This book is an important contribution to medical progress, in that it deals with the immediate neonatal period. It considers the physiologic changes involved in the metamorphosis of the fetus in utero to that of the newborn infant. This metamorphosis includes: (1) the rerouting of the circulation of blood; (2) the assumption of normal air breathing; (3) the substitution of renal for placental regulation of the internal environment, and (4) the replacement of the placenta by the alimentary tract as a source of food supply. When these changes reach physiologic completion, the infant is born. The physician can readily realize the many ways in which this process may go wrong. The presentation of evidence, much of which has been gained by animal studies, accompanied by excellent diagrams and graphic illustrations, will do much to orient the practitioner to the "newborn." It demonstrates that many findings considered abnormal in the older infant are not necessarily abnormal in the immediate neonatal period. Perhaps it will encourage a more conservative approach in remedying these "abnormal circumstances." The chapter on the neonatal aspects of respiration is particularly well presented, and the clinical summaries at the end of each chapter are concise, informative interpretations of the experimental data that can be of use to the clinician. This book should be readily available in the libraries of all physicians dealing with the newborn infant.—*Commander E. R. Moeller, MC, U. S. N.*

Eosinophilic Granuloma of the Rib

Sanford W. French, III, *Colonel, MC, U. S. A.* (1)

BECAUSE eosinophilic granuloma of the rib is not frequently encountered two cases are here reported.

Case 1. A 21-year-old man entered this hospital on 3 December 1949 complaining of pain in the left side of the chest of 1-month duration. At the onset, this pain was severe for about 4 days and was increased on deep breathing. The patient also had some pain in the left arm at this time. The pain in the left side of the chest, which was associated with coryza, then practically disappeared and the patient became relatively asymptomatic, but on 21 November a routine roentgenogram of the chest, taken in his local dispensary, revealed a lesion of the left fifth rib. After 2 weeks' observation in the dispensary the patient was then sent to this hospital where he stated he had slight pain in the left chest and that he was unable to sleep on his left side. This pain was accentuated on inspiration but there was no cough or any other pulmonary symptoms. There was no history of trauma. The patient had lost about 6 pounds in the month prior to admission.

On admission his temperature was 99° F., pulse rate 88, and respirations 18. His leukocyte count was 6,500 with 60 percent neutrophils, 36 percent lymphocytes, 2 percent monocytes, and 2 percent eosinophils. A roentgenogram of the chest revealed an area of osteolysis involving the left fifth rib in the posterior axillary line which measured about 4 by 2 cm. This area did not resemble an old fracture or osteomyelitis and appeared to be an osteolytic type of tumor (fig. 1). A skeletal survey, intravenous pyelograms, and serum calcium and serum phosphorus determinations threw no light on the diagnosis.

The patient's condition in the hospital remained about the same as on admission. About every other day his temperature would go up to 99° or 99.4° F. No preoperative diagnosis was made. A left thoracotomy was performed on 15 December with a block resection of 15 cm. of the left fifth rib beginning at the spine medially and extending out past the angle of the rib. This resection included the rib, intercostal muscles,

(1) 118th Station Hospital.

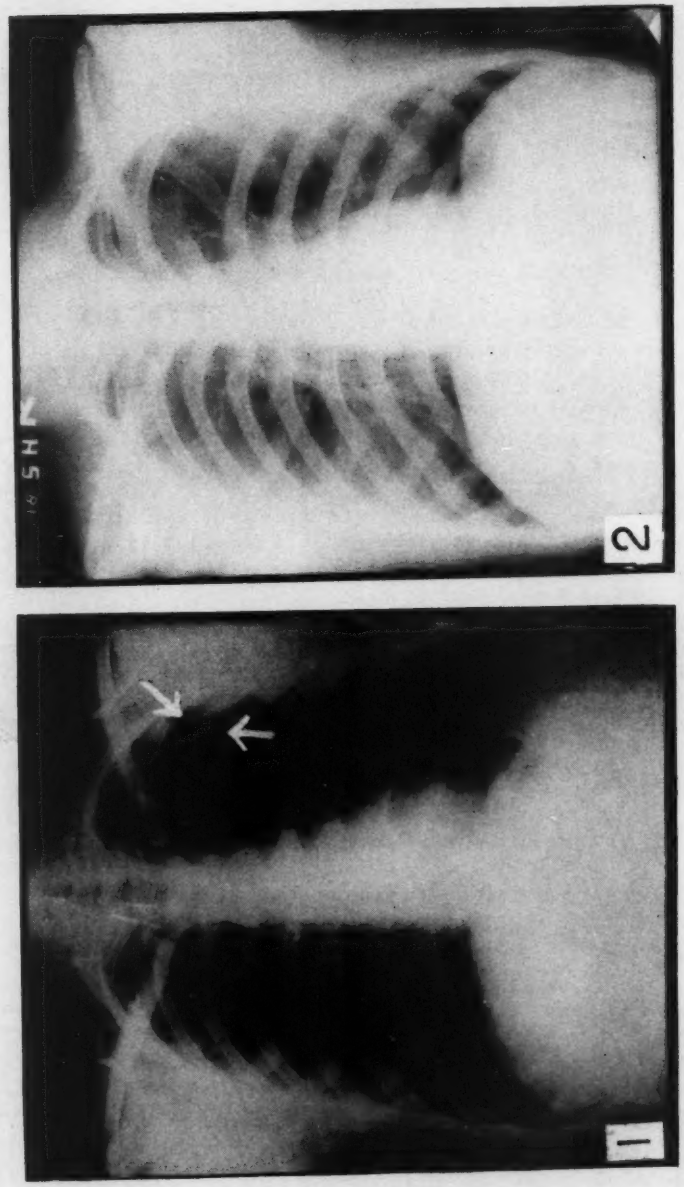


Figure 1 (case 1). Arrows indicate the lesion of the left fifth rib in the posterior axillary line. Figure 2 (case 1). Postoperative film of chest taken 12 days after left thoracotomy.

and pleura. The tumor was not broken into during operation. The removed specimen was then opened and examined. The tumor measured about 5 cm. in length and about 3 cm. in width. The rib substance was completely lost in the area of the tumor and had been replaced by a somewhat circular, mustard-colored, soft tissue tumor mass, which had the consistency of a sea sponge. A fracture at the tumor site could have occurred at any time as there was just a shell of the rib cortex remaining. The pathologist reported eosinophilic granuloma. The patient was discharged from the hospital completely asymptomatic on 4 January 1950.

Case 2. A 28-year-old man was admitted to this hospital on 31 December 1950 complaining of a constant pain in the right lower posterior portion of his thorax of 5 weeks' duration. Five weeks prior to admission he had noted a sudden sharp pain in the right posterolateral part of the chest while lifting a heavy object. The pain was aggravated by exercise, lying in bed, and coughing. The patient also complained of anorexia for the previous 2 months associated with slight general malaise. He attributed this to long hours and hard work in Korea.

Physical examination was negative except for a tender area over the anterior axillary line along the course of the right ninth rib. A firm mass measuring 2 by 2 cm. was palpable in the region of the angle of the right ninth rib. This mass appeared attached to the rib but not to the skin or surrounding tissues. The leukocyte count was 8,500 with 60 percent neutrophils, 34 percent lymphocytes, 5 percent eosinophils, and 1 percent basophils. A roentgenogram of the chest revealed a lytic lesion of the posterior arc of the right ninth rib about 4 cm. long and 2 cm. wide. There was no evidence of soft tissue invasion or bone production. A roentgenogram of the skull was essentially negative. A long bone survey revealed several osteomas about the left knee. A preoperative diagnosis of eosinophilic granuloma was made. On 12 January 1951 about 11 cm. of rib along with the intercostal muscle bundle on either side of the tumor was resected en bloc. The patient's postoperative course was uneventful and after 3 weeks of physical therapy he was returned to full duty.

The pathologist reported that the formalin-fixed specimen consisted of a segment of rib measuring 10.3 cm. in length. In the center of the specimen there was an expanded area having a fusiform shape. This measured 2.2 cm. in width, 1.1 cm. in thickness, and 2.5 cm. in length. The rib had been broken in this area, apparently following removal. The periosteum was elevated by the lesion and was intact as it passed over it. The cut surface through the expanded area had a light yellow-gray color, with a faint brown mottling. Small bony spicules were scattered through the area.

The microscopic sections revealed a tumor composed of a variety of elements. The most prominent cell type was a large stellate or polygonal cell with an abundant eosinophilic or pale faintly vacuolated cytoplasm

971621 O - 51 - 7

and round, oval, or irregular nuclei. The nuclei were relatively uniform in size. They had a prominent nuclear membrane with a reticulated chromatic pattern. Mitotic figures were difficult to find. Scattered faint cells with from 3 to 8 nuclei were seen. Clumps and sheets of these cells were separated by varying amounts of dense fibrous connective tissue. There were many dense accumulations of eosinophils in the tumor. These were most prominent in association with the masses of stellate shaped cells. Numerous dense accumulations of lymphocytes were found throughout the tissue. The tumor had penetrated the cortex of the rib but not the periosteum. There was marked subperiosteal new bone formation over the lesion. Diagnosis: Eosinophilic granuloma.

BOOK REVIEW

Simplified Nursing, by *Florence Dakin,* R. N., former Inspector of Schools of Nursing, State of New Jersey; and *Ella M. Thompson,* B. S., R. N., formerly President, National Association for Practical Nurse Education; Member, Job Analysis Committee, United States Office of Education; Chairman, Production Committee of the Curriculum Committee, United States Office of Education; formerly Consultant, North Atlantic Area, American Red Cross, Volunteer Nurses' Aide Program. 5th edition. 730 pages; 78 illustrations. J. B. Lippincott Co., Philadelphia, Pa., publisher, 1951.

This book has been revised to provide a new and interesting approach to the study of nursing for the practical nurse student. The arrangement of the chapters is logical, beginning with the students, their understanding and care of themselves and their place in the nursing team. Anatomy and physiology of the human body in health and disease are adequately discussed before nursing procedures are presented. Emphasis is placed on the total care of the patient as well as on the patient as a person. The book is written in simple language easily understood yet stimulating enough to encourage the student to seek further knowledge. At the ends of the chapters are brief summaries of key points as well as especially good questions based on real situations. A reference list and a glossary are included. Because this book follows the Practical Nurse Curriculum of 1950 set up by the United States Office of Education, it should be of real value in teaching hospital corpsmen in the services.

—*Lt. Cdr. R. A. Houghton, NC, U. S. N.*

Regional Enteritis

Dan R. Sewell, *Colonel, U. S. A. F. (MC)* (1)

John H. Wilkins, *Major, U. S. A. F. (MC)* (2)

SINCE the original description of regional enteritis by Crohn et al. (3) the literature contains many articles reporting from 1 to 164 cases with suggested methods of treatment. Our purpose in this article is to refresh the mind of the surgeon about this condition which often so closely simulates appendicitis that a correct diagnosis is usually not evident until the abdomen is explored. For this reason the surgeon who undertakes abdominal operations should be capable of selecting and performing the surgical procedure most likely to arrest this condition, so often characterized by chronicity and a tendency to recur.

Regional enteritis is usually described as progressing through four stages, although remission may occur without advancement through all steps. These various stages have been described as acute or irritative, chronic, obstructive, and fistulous. The disease usually becomes manifest by an insidious onset of abdominal cramps, foul nonbloody diarrhea, nausea with occasional vomiting, and weight loss. The presence of fever varies with the stage of the disease; its presence being common when there is mesenteric involvement. The leukocyte count and sedimentation rate are generally elevated. Roentgenologic examination with barium is most likely to reveal a narrowing of the terminal ileum, the so-called "string sign" described by Kantor (4). The case presented herein is one which progressed to the fistulous stage, although there was no evidence of a fistula at the time of the first abdominal exploration. There was, however, early evidence of a retroperitoneal abscess originating from the involved segment of terminal ileum.

CASE REPORT

A 23-year-old man was admitted to the hospital complaining of attacks of nervousness, anorexia, and abdominal cramps associated

(1) United States Air Force Hospital, Kindley Air Force Base, Bermuda.

(2) Office of the Surgeon General, U. S. Air Force.

(3) Crohn, B. B.; Ginzburg, L.; and Oppenheimer, G. D.: Regional ileitis; pathologic and clinical entity. J. A. M. A. 99: 1323-1329, Oct. 15, 1932.

(4) Kantor, J. L.: Regional (terminal) ileitis; its roentgen diagnosis. J. A. M. A. 103: 2016-2021, Dec. 29, 1934.

with nausea and vomiting of about 2 years' duration. The attacks appeared at weekly to monthly intervals and were associated with malaise, fatigue, and gradual weight loss. Two days prior to admission vomiting occurred and was repeated from 6 to 8 times during the next 48 hours.

On admission the temperature was 100.2° F., pulse 88, and respirations 19. Two days following admission the patient complained of moderate pain and tenderness in the right inguinal region on movement of the right leg. Two days later nausea and vomiting reappeared and the abdomen was found to be tender to palpation in the right lower quadrant. The psoas sign was positive on the right. A diagnosis of appendiceal abscess was made and an exploratory laparotomy was performed. A normal appendix was found and was not removed. The terminal ileum was found to be involved in a chronic inflammatory process for about 20 inches proximal to the ileocecal valve, as evidenced by induration, edema, and rubber-tube-like consistency. There was a marked dilation of the ileum proximal to the involved segment. One portion of the involved segment was attached deep in the pelvis. Examination of the remainder of the bowel revealed no apparent involvement. To relieve the obstruction a side-to-side ileotransverscolostomy was accomplished proximal to the involved segment of the ileum. The attachment of the diseased segment in the pelvis was not disturbed. Postoperatively, the patient was given sulfadiazine and penicillin parenterally and, except for minimal intermittent diarrhea, convalesced normally until the seventh postoperative day when a low-grade fever appeared. There was tenderness to palpation in the right lower quadrant of the abdomen and right flank, and the right hip was maintained in a flexed position. An inguinal incision was made on the twenty-second postoperative day and a large abscess, containing about 500 cc. of foul pus, was drained retroperitoneally. The temperature returned to normal and there was marked improvement in the extension of the right thigh. The patient became ambulatory. As the drainage wound closed, the fever and flexion deformity of the thigh returned. The wound was reopened twice for better drainage. Lipiodol injection of the sinus tract showed that it extended posteriorly to the plane of the lumbar spine and superiorly to the second lumbar vertebra (fig. 1). It was concluded at this time that the patient had a fecal fistula originating from the attachment of the involved loop of ileum within the pelvic area and that further operation was necessary. An abdominal celiotomy was performed. The anastomosis between the ileum and transverse colon was found to be functioning well. The terminal ileum involved in the disease process showed no essential change from the condition found at the first operation. In accordance with the method advocated by Garlock *(5)*, the ileum just distal to the anastomosis was transected with closure of the open ends. The fever subsided,

(5) Garlock, J. H.: Present status of problem of regional ileitis. Am. J. Surg. 72: 875-878, Dec. 1946.

Figure 1. (A) *Site of incision for drainage of retroperitoneal abscess.* (B) *and* (C) *Limits of abscess cavity.*

the draining fistula closed, and complete extension of the right thigh was attained. Three weeks postoperatively barium enema was accomplished (figs. 2 and 3). The patient's condition was much improved and he was granted a 30-day furlough following which he was completely asymptomatic and had gained 20 pounds.

DISCUSSION

Cutler *(6)* believed that regional enteritis should be treated medically unless complicated by obstruction, fistula, et cetera, but most

(6) Cutler, E. C.: Neglected entity in abdominal pain and common disease—cicatrizing enteritis. New York State J. Med. 39: 328-337, Feb. 15, 1939.

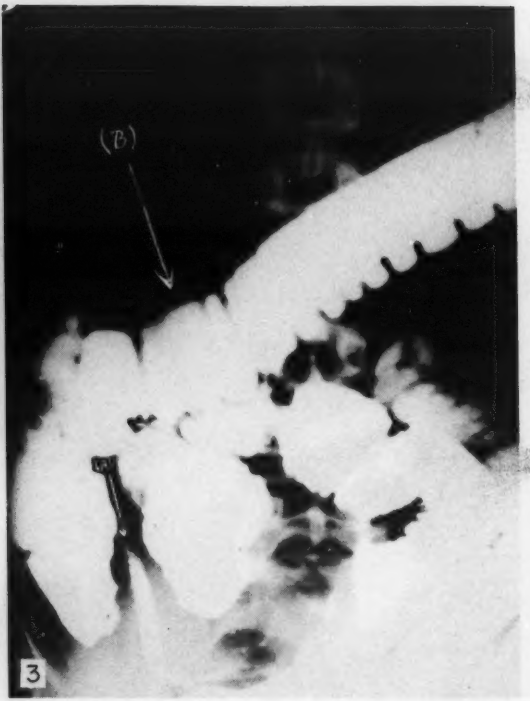


Figure 2. (A) Site of ileotransverscolostomy. Figure 3. (A) Involved ileum demonstrated by barium enema following transection of ileum above involved segment. (B) *Site of previous ileotransverscolostomy.*

observers advocate operation in the chronic stage of the disease in order to avoid these complications. Pugh (7), in reporting his series of cases, noted that 5 received penicillin and showed marked improvement. Our patient received about 40 million units of penicillin between the first and last operative procedures and the involved portion of his ileum showed little change on gross examination.

Kiefer and Ross (8), in reporting 107 cases, concluded that in early acute enteritis without complications, operation was best deferred because about 40 percent of their cases resolved satisfactorily. In chronic terminal ileitis with complications such as perforation, abscess formation, and fistula formation, they recommended resection of the diseased portion of the terminal ileum and the ascending colon. They believed that side-to-side ileocolostomy without resection is unsatisfactory except as a preliminary step to resection.

Garlock and Crohn (9), in reporting 164 cases, urge ileotransverscolostomy in ileitis with exclusion of the involved portion by transection of the ileum proximal to the involved portion with closure of the open ends. They concluded that resection of the involved portion, whether in one or two stages, is unnecessary. They found in most instances where resection was performed that the disease in the involved bowel was inactive and that fistulas closed spontaneously. In their cases where resections were performed, recurrences were more frequent, and the mortality rate was higher. In 65 patients treated by ileotransverscolostomy with exclusion, there were no deaths and the recurrence rate was 10.5 percent. On the other hand, 55 of their patients underwent a one-stage ileocolic resection with a 16.3 percent mortality and with a 15.4 percent recurrence rate. Two-stage ileocolic resections were performed on 25 patients with a mortality of 12 percent and recurrence rate of 28.6 percent. In 9 patients with ileocolitis, treatment with resection resulted in a 10.5 percent mortality.

Garlock further indicated that ileotransverscolostomy with the diseased bowel left in continuity should not be performed because a stagnant pool of infected material results from which complications may arise. He described 4 patients who had come to him for chronic fistula, following anastomosis with continuity of the diseased bowel intact, for whom cure was attained by simple transection of the ileum above the pathologic portion with closure of the open ends. The soundness of this principle is demonstrated by our case.

COMMENT

The case presented in this report was originally treated by ileotransverscolostomy with the bowel left in continuity. Following the

(7) Pugh, H. L.: Regional enteritis. Ann. Surg. 122: 845-861, Nov. 1945.
(8) Kiefer, E. D., and Ross, J. R.: Criteria in management of chronic ileitis. J. A. M. A. 129: 104-108, Sept. 8, 1945.
(9) Garlock, J. H., and Crohn, B. B.: Appraisal of results of surgery in treatment of regional ileitis. J. A. M. A. 127: 205-208, Jan. 27, 1945.

operation, an extraperitoneal abscess and fistula appeared. After repeated drainage of the abscess, exclusion of the diseased portion of the ileum was performed by transection between the previous anastomosis and involved segment of bowel with closure of the oper ends. There followed immediate remission of all symptoms. Although there is insufficient follow-up on this patient, it is desired to stress the rapidity with which exclusion of the diseased bowel gave relief. Good results were achieved in this case following the procedure recommended by Garlock, which is associated with a lower mortality and a lower recurrence rate than procedures advocated by others. Furthermore this procedure is safer in the hands of the less experienced general surgeon. The average surgeon should consider such a procedure when he is confronted with a chronic terminal ileitis complicated by obstruction, abscess, or fistula formation.

BOOK REVIEW

Chronology of Ophthalmic Development, An Outline Summary of the Anatomical and Functional Development of the Visual Mechanism Before and After Birth, by *Arthur H. Keeney,* M. D., Wills Eye Hospital, Philadelphia, Pa. Publication Number 99, American Lecture Series, A Monograph in American Lectures in Surgery. 22 pages. Charles C Thomas Publisher, Springfield, Ill., 1951. Price $2.

This monograph is based on 3 charts, the first of which shows the prenatal development of the orbit, extraocular vascular system, nerve supply and extraocular muscles, lens and capsule, optic nerve, hyaloid system and retinal circulation, and the vitreous and suspensory ligament from the third week until birth. The second chart shows through the same period the development of the retina, macula, choroid, lids, lacrimal apparatus, cornea, iris, ciliary body, sclera, and Schlemm's canal. The third chart shows the postpartum development from the neonatal period to 20 or 25 years of the structures indicated in charts 1 and 2. There is also a short outline on the functional development of vision and binocularity from the third fetal month until 9 years of age. The author states, "It is the purpose of this outline—original only in organization and, in some cases, interpretation—to bring together in terse form and to collate for easy reference the currently established data concerning ophthalmic development." It does this very well and is an excellent reference pamphlet for ophthalmologists and medical students.—*Brig. Gen. E. Maxwell, U. S. A. F. (MC)*

Management of the Neurogenic Bladder

James C. Kimbrough, *Colonel, MC, U. S. A. (1)*

THE treatment of neurogenic bladder is definite from the time of injury until recovery or death, and is based on fundamental principles. Any variation from these fundamentals will result in disaster for the patient and humiliation for the physician

Fundamental precepts. As soon as the presence of neurogenic bladder is determined, insert a urethral catheter and leave it in place until the patient recovers, dies, or has a cystostomy. Maintain continuous catheter drainage, tidal or otherwise, until the bladder recovers its function, or it is determined that the bladder will not recover. Perform a suprapubic cystostomy at the end of 4 weeks, or earlier it bladder function does not show definite evidence of recovery, provided the general condition of the patient ofrers reasonable life expectancy.

Precautions. Do not permit the bladder to become overdistended; do not depend on spontaneous overflow or manual expression of urine; do not depend on intermittent catheterization; and do not keep the catheter in place in the presence of severe infection.

These are the fundamental principles of the treatment of the neurogenic bladder. They cannot be violated with impunity. All other measures such as nursing care to prevent decubitus ulcers, the use of urinary antiseptics, and regulation of fluid intake are secondary considerations. A urethral catheter cannot be left in place indefinitely without serious consequences. Complications can usually be avoided for a period of from 4 to 6 weeks, after which a cystostomy should be performed. The chief and almost the only problem of treatment is the prevention of infection and its complications.

Cystometric studies are valuable procedures in determining the condition of the bladder musculature. Early evidences of return of function are ascertained by this method before any clinical signs of recovery

(1) Walter Reed Army Hospital, Washington, D. C.

are manifested. Simple apparatus is preferred. The water manometer is adequate. The more complicated mercury manometers may be used by those who desire to carry out this examination in great detail. The Lewis cystometer is one of the latest and most complete types of apparatus available. The cystometrogram should be made as soon as possible and at monthly intervals thereafter. Cystoscopy should be performed before the fourth week and at monthly intervals thereafter. This procedure aids in the determination of bladder function and if small calculi are found they may be evacuated without operation. A cystoscopic table with trapeze should be available. It is important to ascertain the condition of the upper urinary tract. This can be done by excretory urography—at least every 3 months.

Catheter care. Use a No. 16, 5-cc. Foley bag catheter. Constriction of the urethra about the catheter prevents drainage around the catheter and promotes infection of the urethra and epididymis. Change the catheter every 7 days. The catheter should be fixed to the abdomen to prevent pressure necrosis at the penoscrotal angle.

Irrigation. Use the closed system of irrigation, automatic tidal, manual tidal, or other type. Irrigation should be carried out with buffered citrate solution or other modification of Suby's solution (2).

General considerations. Urine cultures should be made every 2 weeks, sensitivity tests obtained, and the proper urinary antiseptic prescribed. Renal function, blood chemistry studies, and other laboratory tests should be carried out as indicated. A calculus preventive regimen—diet, fluid intake, amphojel (Shorr technic) and early ambulation—should be kept in force. The urethra, external genitalia, and perineum should be examined daily. Epididymitis, periurethral abscess, urolithiasis or pyelonephritis should be met early by appropriate measures, removal of the urethral catheter, and cystostomy drainage. Catheter or suprapubic drainage may be discontinued when an automatic bladder with less than 100 cc. of residual urine has been developed. In ambulatory patients, bladder neck obstruction should be evaluated and transurethral resection performed when indicated. Testosterone may be used to prevent nitrogen depletion.

The paramount problem in the care of the neurogenic bladder is the prevention of urinary tract infection. Adequate drainage is essential to keep the bladder clear of bacteria. Rarely is it possible to maintain catheter drainage for long periods without serious complications.

---

(2) Suby's solution: 32.3 grams of citric acid; 3.8 grams of magnesium oxide; 4.4 grams of sodium carbonate (anhydrous); and distilled water to make 1,000 cc.

Vivax Malaria With Long Incubation Periods

Report of Seven Cases

E. E. Eddleman, Jr., *Lieutenant, MC, U. S. N. R.* (1)
William H. Hale, *Lieutenant, junior grade, MC, U. S. N. R.* (1)
William M. Snowden, *Commander, MC, U. S. N.* (1)

ALTHOUGH the occurrence of malaria in military personnel returning from the South Pacific Area during World War II is well known (2-4), no report of malaria in Korean veterans has been found in the literature. This is a report of 7 proved cases of vivax malaria which were seen at this infirmary from May through July 1951 in military personnel having returned from Korea. These cases are of special interest because the symptoms of malaria occurred from 2½ to 8 months after their return to the United States.

CASE REPORTS

Case 1. Two days before admission this man first noticed malaise and nausea. He had a severe chill followed by fever the day preceding admission. It was noted after admission that the chills occurred about 48 hours apart; the fever lasted from 4 to 8 hours following the chills. The patient had been stationed in Korea for 4 months during the summer and fall of 1950, but had been in the United States 8 months previous to the occurrence of the symptoms. Since his return, he had not been out of California. There was no previous history of malaria. He had received chloroquine suppressive therapy while in Korea. The admission diagnosis was influenza. The physical examination revealed an acutely ill man with a temperature of 104° F. The spleen was not palpable nor was there any enlargement of the lymph nodes. The

(1) U. S. Marine Corps Air Station, El Toro (Santa Ana), Calif.

(2) Coggeshall, L. T.: Malaria and filariases in returning servicemen; ninth Charles Franklin Craig lecture. Am. J. Trop. Med. 25: 177-184, May 1945.

(3) Noe, W. L., Jr.; Greene, C. C., Jr.; and Cheney, G.: Natural course of chronic Southwest Pacific malaria. Am. J. M. Sc. 211: 215-219, Feb. 1946.

(4) Baker, B. M., and Platt, D.: Vivax relapse rates following continued atabrine suppressive medication; observations on malaria in infantry regiment. Bull. Johns Hopkins Hosp. 81: 295-304, Nov. 1947.

leukocyte count was 6,150 with a normal differential count. A blood smear for malaria, taken on the third hospital day, was positive for *Plasmodium vivax*. After giving 1 gram of chloroquine daily for 2 days, he became asymptomatic.

Case 2. This man was admitted with chills, fever, headache, profuse sweating, and abdominal cramps. The illness was characterized by violent chills followed by fever, occurring at intervals of about 48 hours for 1 week before admission. Between chills he had only mild abdominal cramps and headaches. He had been in Korea from July 1950 until March 1951. He received chloroquine as suppressive therapy for malaria only during his first 3 months in Korea. He gave no history of previous malaria. His symptoms appeared about 3 months after his return to the United States. He was admitted with the diagnosis of malaria. The physical examination was negative except for splenomegaly. On the second day after admission, he experienced a shaking chill after which his temperature rose to 104° F. A blood smear for malaria at this time was positive for *P. vivax*. The leukocyte count was 2,800 with 81 percent lymphocytes. After the initiation of treatment, consisting of 2.5 grams of chloroquine given during a 36-hour period, the patient became asymptomatic.

Case 3. This man's illness began 4 days before admission with malaise and arthralgia. The day before admission, he had a chill followed by fever. Following admission, the chills occurred about 24 hours apart. The patient had had malaria in 1944 without a relapse He had been in Korea from June 1950 to January 1951 and had returned to the United States 5 months before the onset of the present illness. He had not received any suppressive therapy for malaria while in Korea. He was admitted with a diagnosis of pneumonia. On admission, his temperature was found to be 104° F. The physical examination was negative. The spleen was not palpable. The leukocyte count was 7,000 with a normal differential count. Blood smears on the third hospital day were positive for *P. vivax*. The patient was given 2.5 grams of chloroquine over a 36-hour period. He was discharged on the fifth hospital day without symptoms.

Case 4. This man was admitted with chills, fever, malaise, and nausea present for 6 days. During that time, the chills and fever occurred nightly. The patient had been in Korea from July 1950 until April 1951. He had returned to the United States about 2½ months before the onset of the present illness. There was no previous history of malaria. He had received chloroquine as suppressive therapy only during the first 2 months in Korea. The temperature on admission was 99° F., but a few hours after a chill it rose to 102.8° F. The physical examination was negative. The spleen was not palpable. The leukocyte count was 8,700 with a slight lymphocytosis. The blood smear for malaria revealed *P. vivax*. He was given 2.5 grams of

chloroquine orally over a 36-hour period. He was discharged without symptoms on the sixth hospital day.

Case 5. This man's illness began 2 days before admission with malaise, headache, backache, and lethargy. The first chill occurred about 12 hours before admission followed by a second chill 48 hours later. He had been in Korea from July 1950 until March 1951. He returned to the United States about 3½ months before the onset of symptoms. There was no past history of malaria. He had not received any suppressive therapy for malaria while in Korea. His temperature was normal on admission. The physical examination was negative except for a barely palpable spleen. The leukocyte count was 8,000 with a slight lymphocytosis. A blood smear for malaria revealed *P. vivax.* The patient was given 2.5 grams of chloroquine orally in a 36-hour period. He was discharged asymptomatic on the fourth hospital day

Case 6. This man was admitted with a history of chills, fever, nausea, arthralgia, and headache of 2 days' duration. The diagnosis on admission was influenza. During hospitalization it was noted that chills and fever occurred every 48 hours. *P. vivax* were then demonstrated in a blood smear. The patient had been on duty in Korea from August 1950 until April 1951. He received chloroquine for the suppression of malaria only during the first 2 months of foreign duty. He had been returned to the United States about 2½ months before the appearance of symptoms. There was no previous history of malaria. On admission the temperature was 103° F. The physical examination was negative. The spleen was not palpable. The leukocyte count was 4,400 with a normal differential count. A blood smear for malaria taken during a chill was positive for *P. vivax.* The patient was given 2.5 grams of chloroquine orally in a 36-hour period. He was discharged asymptomatic on the ninth hospital day.

Case 7. This man became ill about 1 week before admission with a chill followed by fever. During the week, he developed a microscopic hematuria and a diagnosis of hemorrhagic cystitis was considered. The chills were repeated at intervals of about 48 hours and were associated with backache and malaise. Malaria was then suspected as he had been in Korea from July 1950 until April 1951. He had received chloroquine for suppression of malaria only in April 1951. The symptoms of malaria appeared about 2½ months after he returned to the United States. He had no previous history of malaria. The temperature on admission was 104° F. The only significant finding on physical examination was a palpable spleen. The leukocyte coun. was 8,100 with a normal differential count. Blood smear revealed *P. vivax.* Two grams of chloroquine were administered on the first day, 1 gram on the second day, and 0.5 gram the following day. The patient became asymptomatic and was discharged on the third hospital day.

DISCUSSION

The significant clinical data on the 7 patients with malaria are tabulated in table 1. The most interesting finding in these cases of vivax malaria is the apparent long incubation periods, as compared with the usual stated incubation period of from 8 to 17 days. Long incubation periods have been noted previously *(5, 6)*. The case of vivax malaria reported by Jordan occurred 27 months after the initial infection *(5)*.

It is unlikely that the infection in the patients reported was acquired initially after their return to the United States because California is not an endemic area for malaria. The probability is that these patients were infected during the summer of 1950 because the Korean winters are adverse to the breeding of mosquitoes and the transmission of the parasite. This places the probable incubation periods in these patients from 8 to 10 months. Shute *(6)* reported 9 patients with vivax malaria with incubation periods of as long duration. He pointed out that the attacks occurred the following spring after the initial infection occurred during the previous summer and fall. This is further illustrated by our first patient who returned to the United States 8 months before the development of symptoms. His location was restricted to an Army Hospital in California. Chloroquine suppressive therapy probably was not responsible for these long incubation periods as 2 of our cases had not received any chloroquine prior to the appearance of symptoms. Quinacrine suppressive therapy, however, has been noted to delay the onset of vivax malaria *(7)*. Of 101 patients studied, the symptoms of malaria appeared in from 3 to 104 days after cessation of quinacrine suppressive therapy. Whether chloroquine suppressive therapy in the usual dose (0.5 gram weekly) prevented the development or effected a cure of any cases of malaria is not known. Because 5 of our patients had received chloroquine suppressive therapy, it is apparent that it does not prevent the later appearance of malaria. Quinacrine suppressive therapy is believed to actually prevent the later appearance of malaria. In a study by Baker and Platt *(4)*, the relapse rate in personnel who were in an area heavily endemic for malaria was much less if quinacrine suppressive therapy was continued for at least 6 months following the departure from that endemic area. Thus quinacrine may be a curative agent when given over long periods of time. Chloroquine is apparently curative only in falciparum malaria *(8, 9)*.

(5) Jordan, W. S., Jr.: Primary attack of vivax malaria occurring 27 months after infection. New England J. Med. 239: 397-399, Sept. 9, 1948.

(6) Shute, P. G.: Latency and long-term relapses in benign tertian malaria. Tr. Roy. Soc. Trop. Med. & Hyg. 40: 189-200, Oct. 1946.

(7) London, I. M.; Kane, C. A.; Schroeder, E. F.; and Most, H.: Delayed primary attack of vivax malaria. New England J. Med. 235: 406-410, Sept. 19, 1946.

(8) Loeb, R. F., et al.: Activity of new antimalarial agent, chloroquine (SN 7618): statement approved by the Board for Coordination of Malarial Studies. J. A. M. A. 130: 1069-1071, Apr. 20, 1946.

(9) Cooper, W. C.: Summary of antimalarial drugs. Public Health Rep. 64: 717-732, June 10, 1949; Drogas antimaláricas; resumen. Bol. Ofic. san. panam. 28: 1005-1023, Oct. 1949.

TABLE 1. *Significant clinical data on the 7 patients with vivax malaria*

Case	Apparent incubation period (months)	Previous history of malaria	Suppressive medication in Korea	Admission diagnosis	Interval between chills (hours)	Admission leukocyte count	Palpable spleen
1	8	No	Yes	Influenza	48	6150	No
2	3	No	Yes	Malaria	48	2800	Yes
3	5	Yes	No	Pneumonia	24	7000	No
4	2½	No	Yes	Malaria	24	8700	No
5	3½	No	No	Malaria	48	8000	Yes
6	2½	No	Yes	Influenza	48	4400	No
7	3	No	Yes	Malaria	48	8100	Yes

The symptoms in these 7 patients were typical of vivax malaria *(10)*. The presence in 3 of them of vague arthralgia, malaise, and chills without the 48-hour interval suggested a clinical picture of influenza. Three of our patients had a palpable spleen, which was a help in the diagnosis. The leukocyte counts were low or normal.

Because these patients had been in all of the major sections of Korea, no localization as to a probable endemic area could be made. Vivax malaria was the usual variety noted in veterans returning from the South Pacific Area during World War II *(2)*. This variety tended to relapse frequently for as long as 3 years. Whether these cases of malaria, contracted in Korea, will also tend to relapse is not known at present. Vivax is not the only variety of malaria seen in Korea. One case of flaciparum malaria was reported during the Seoul campaign in September 1950 *(11)*.

Chloroquine was the drug used in all of the cases and gave excellent immediate results. The regimen followed has been outlined *(9)*. It consists of 1 gram of chloroquine initially, followed by 0.5 gram in 6 hours, and 0.5 gram daily for 2 days. Later, a maintenance dose of 0.5 gram a week was given. Chloroquine is probably the drug of choice for the treatment of vivax malaria because it has few undesirable side effects *(12-14)* but relapses following its use occur frequently. It is effective in controlling the acute symptoms of quartan malaria *(15)* and is curative for falciparum malaria *(8, 9)*. No failures or relapses have occurred in our experience. Toxic symptoms likewise have been absent.

SUMMARY

Seven cases of plasmodium vivax in Korean veterans were admitted to this infirmary between May and July 1951. Apparent incubation periods of from 2½ to 8 months were noted in these cases. All were treated with chloroquine with excellent immediate results.

Note: Since this article was submitted, a relapse occurred in case 6.

(10) American Association for the Advancement of Science: A Symposium on Human Malaria with Special Reference to North America and the Caribbean Region. Publication No. 15. The Association, Washington D. C., 1941. pp. 183-189.

(11) Eddleman, E. E., Jr.: Personal observation.

(12) Warthin, T. A.; Levine, S. A.; and Evans, R. R.: Malaria; observations on treatment with chloroquine (SN 7618) and combined quinine and plasmochin. New England J. Med. 238: 467-469, Apr. 1, 1948.

(13) Gordon, H. H. (Longview, Tex.); Dievaide, F. R.; Marble, A.; Christianson, H. B.; and Dahl, L. K.: Treatment of Plasmodium vivax malaria of foreign origin; comparison of various drugs. Arch. Int. Med. 79: 365-380, Apr. 1947.

(14) Most, H.; London, I. M.; Kane, C. A.; Lavietes, P. H.; Schroeder, E. F.; and Hayman, J. M., Jr.: Chloroquine for treatment of acute attacks of vivax malaria. J. A. M. A. 131: 963-967, July 20, 1946.

(15) Young, M. D., and Eyles, D. E.: Efficacy of chloroquine, quinacrine, quinine and totaquine in treatment of Plasmodium malariae infections (quartan malaria). Am. J. Trop. Med. 28: 23-28, Jan. 1948.

Present Concepts of Compensation for Fluid and Electrolyte Alteration

Stuart H. Walker, *Major, MC, U. S. A.*

THE remarkable resiliency of the body in compensating for fluid and electrolyte alterations has been apparent for many years but only recently have the mechanisms involved been elucidated. Consideration of these mechanisms is essential to the proper therapy of initial pathologic alterations and to the maintenance of fluid and electrolyte balance. The priorities on which the mechanisms depend must also be understood. Many factors operate simultaneously, and the clinical findings are the result of the adjustments essential to maintain life. Therapy must follow a similar pattern and give priority to the most essential factors if it is to meet with success.

The factors most essential to body function which may be interfered with by fluid and electrolyte imbalance are (1) plasma volume, (2) extracellular and intracellular osmolarity, and (3) pH. As long as these factors can be maintained within normal levels, normal function will continue despite marked alteration in total fluid and electrolyte content. When any of these factors is significantly altered, pathologic changes become rapidly apparent.

CONTROL OF PLASMA VOLUME

An adequate plasma volume is essential for the transport of oxygen and metabolites to the central nervous system, the heart, and the kidneys and for the carrying of carbon dioxide and waste products from these organs. The extremely dangerous effects of alteration of plasma volume have required that its maintenance receive first priority from homeostatic defense mechanisms. The chief mechanism by which plasma volume is maintained is by fluid transfer between the interstitial and intravascular fluid compartments. Elkington and Taffel *(1)* have shown that in a thirsting dog, body fluid loss is chiefly from the interstitial

(1) Elkington, J. R., and Taffel, M.: Prolonged water deprivation in dog. J. Clin. Investigation 21: 787-794, Nov. 1942.

971621 O - 51 - 8

phase of the extracellular compartment for the first few days and may amount to over 50 percent of the total extracellular volume without causing a significant change in plasma volume. The use of intracellular fluid to maintain the volume and osmolarity of extracellular fluid constitutes the largest defense of plasma volume. The physiologic limit of this transfer is a loss of 30 percent of the intracellular compartment *(1)*.

Gamble *(2)* has demonstrated that, with rapid fluid loss from pyloric obstruction in dogs, a shift of fluid from the intracellular to the extracellular compartment may take place to such a degree that a reduced osmolarity of the extracellular fluid results. This seems to indicate the relatively greater necessity of maintaining plasma volume than of maintaining osmolarity.

The control of water loss (and plasma volume) through the excretion of a concentrated urine is interfered with by the urea production from protein breakdown, the ketosis associated with diminished glucose intake, and the excretion of potassium which is released from shifted intracellular fluid. Thus, an obligatory renal water loss in excess of normal minimal requirements is common under the conditions of pathologic fluid imbalance. If an excessive, rapid extracellular fluid loss occurs, particularly if associated with red blood cell and protein loss, fluid shifts from the interstitial and the intracellular spaces may be incapable of sufficiently rapid replacement of plasma volume and shock may appear. If depletion of the intracellular fluid compartment occurs beyond the 30 percent limit, then diminution of plasma volume will appear in association with intracellular damage, but, short of extremely rapid fluid loss or marked depletion of intracellular fluid, plasma volume is usually effectively maintained by fluid shifts from the interstitial and intracellular compartments.

CONTROL OF OSMOLARITY

Maintenance of the normal osmolarity of the extracellular and intracellular fluid seems to be essential to the body for several reasons. Maintenance of the normal sodium-water ratio of the extracellular fluid is essential to the maintenance of plasma volume. Maintenance of the normal potassium-protein-water relationship in the intracellular fluid seems to be essential to cellular function as alteration in either direction may produce cellular damage. Temporary alterations in osmolarity continually occur, but intact renal function always restores the normal relationship. Apparently osmolarity is of secondary importance, however, as demonstrated by the dilution of extracellular fluid by intracellular water in an attempt to maintain plasma volume.

The chief mechanism for the maintenance of osmolarity, previously alluded to, is the transfer of water between the extracellular and intra-

(2) Gamble, J. L., and Ross, S. G.: Factors in dehydration following pyloric obstruction. J. Clin. Investigation 1: 403-423, June 1925.

cellular compartments when alteration of the osmolarity of either occurs (3). The osmolarity of the extracellular fluid depends on the sodium-water ratio as the other cations show little variation and derive from large body pools and the anions are automatically adjusted to the cation level by the presence of diffusible bicarbonate ions. The osmolarity of the intracellular fluid depends on the potassium-water ratio as cation replacement of potassium is available to only a limited degree and intracellular fluid anions may be readily transferred to the extracellular compartment and excreted. Water shifts are required by osmolar pressure alterations across the cell membranes and therefore occur whenever alterations of proteins or cations occur.

Secondary adjustments are necessary to maintain the osmolarity of the compensating compartment and accurately to restore the osmolarity of each after alteration in either occurs. These adjustments are conducted by the kidney and do not occur in the absence of renal function (e. g., lower nephron nephrosis). Gamble (2) has shown that in association with a shift of intracellular fluid to the extracellular compartment, a proportional increase in the urinary excretion of potassium occurs. This is to be expected as necessary to the restoration of intracellular osmolarity. Because the extracellular concentration of potassium is low, its transport to and excretion by the kidney is a slow process. Therefore, the adjustment of intracellular osmolarity may be markedly delayed when extracellular alterations occur (4).

Darrow and Pratt (5) demonstrated that a more rapid compensation for osmolar changes exists in the shift of sodium between the intracellular and extracellular fluids whenever osmolar alteration in either compartment occurs. The normal intracellular sodium concentration is approximately equivalent to extracellular bicarbonate concentration and bears a direct relationship to this anion. Sodium may replace about one-third of a deficit of intracellular potassium according to Darrow and Pratt (5). They have shown that the maintenance of intracellular sodium at various concentrations depends on a comparable increase or decrease in extracellular bicarbonate. Chloride cannot pass the cell membrane, and, therefore, in effect, only the sodium available to combine with bicarbonate is free to shift intracellularly and maintain the diffusion of sodium ions into the intracellular fluid. Renal alteration of extracellular bicarbonate, chiefly through alteration in chloride, is achieved gradually to decrease the osmolar work of maintaining intracellular sodium and maintain this equilibrium.

The actual shift of sodium depends on the extracellular sodium concentration and the intracellular potassium concentration. Increased

(3) Gamble, J. L.: Clinical Anatomy, Physiology and Pathology of Extracellular Fluid. Harvard University Press, Cambridge, Mass., 1949.

(4) Darrow, D. C., and Yannet, H.: The changes in distribution of body water accompanying increase and decrease in extracellular electrolyte. J. Clin Investigation 14: 266-275, Mar. 1935.

(5) Darrow, D. C., and Pratt, E. L.: Fluid therapy; relation to tissue composition and expenditure of water and electrolyte. J. A. M. A. 143: 432-439, June 3, 1950.

diffusion into the intracellular fluid is associated with elevated extracellular sodium or decreased intracellular potassium and increased diffusion into the extracellular fluid with diminished extracellular sodium or increased intracellular potassium. Darrow and Pratt (5) have shown that the shift of sodium to the intracellular compartment associated with extracellular water loss is diminished when extracellular sodium is decreased, but nevertheless still occurs. In contrast, an increase in extracellular sodium (as produced by excessive parenteral administration of sodium) may cause displacement of potassium from intracellular fluid. Retention and increased shift of sodium into the intracellular fluid with loss of potassium from the intracellular fluid is the characteristic pattern of adrenal action in times of stress and can be detected in most conditions associated with fluid and electrolyte imbalance.

The results of this sodium shift are twofold. Most important, it constitutes an effective method of maintaining osmolarity and always occurs in a direction opposite to the transfer of water between the fluid compartments. In addition, the immediate effect of transfer of sodium without chloride across the cell membrane is an alteration in the bicarbonate, which acts as a buffer in the acid-base equilibrium. Initial alterations in bicarbonate occasioned by loss or increase in available extracellular sodium are gradually counteracted by renal compensation for the increased osmolar work of maintaining dissimilar extracellular bicarbonate and intracellular sodium concentrations. The necessity of reaching this equilibrium following an initial alteration in sodium or potassium or both may create a persistent alteration in extracellular bicarbonate.

The failure of water and sodium transfer and the adjustment of intracellular potassium to maintain osmolarity is characteristically seen in adrenal insufficiency which indicates that control of renal tubular function by the adrenal gland determines intracellular and extracellular osmolarity. Impaired renal function caused by kidney disease or occurring as a consequence of insufficient sodium for the excretion of water, or as a result of insufficient water for the excretion of sodium, will prevent the adjustment of osmolarity. Renal failure of this type is frequently associated with edema and altered central nervous system function caused by the expansion and disordered osmolarity of the interstitial space. Under such circumstances, without renal function, fluid administration may accentuate rather than relieve the disordered osmolarity. The administration of excessive water when sodium depletion exists, or of excessive sodium when water depletion exists, causes an increased alteration of extracellular osmolarity and prevents the restoration of renal function.

Failure of control of osmolarity because of rapid and excessive fluid and electrolyte loss may rarely result in extracellular hypoosmolarity because of the predominant loss of electrolytes in sweat and

intestinal secretions. Commonly, however, the rapid loss of electrolytes is counterbalanced by the failure of water intake and the continued insensible water loss so that extracellular hyperosmolarity occurs early despite the intracellular water transfer. In contrast, when failure of control of osmolarity occurs after prolonged fluid and electrolyte loss, it usually results in extracellular hypoosmolarity because of the excessive transfer of intracellular water in an attempt to maintain plasma volume *(6)*. Failure of renal function with cessation of renal excretion of potassium may prevent such water transfer, however, and thus permit a continued extracellular hyperosmolarity. The type of osmolar failure which is present in any given case may be difficult to estimate without the determination of plasma ion concentrations. The common causes of extracellular fluid loss result in extracellular hyperosmolarity because the loss of water is relatively greater than that of electrolytes. These losses in turn produce intracellular water and potassium loss and require chiefly water and potassium replacement.

CONTROL OF pH

The control of pH within the body fluids appears to be essential to the maintenance of certain enzyme systems, protein valency, and calcium ionization, but maintenance of pH seems to have third priority and alterations in this factor may even be induced by the compensatory mechanisms for the maintenance of plasma volume and osmolarity.

The chief mechanism for the control of pH is the bicarbonate buffer system and pH has been shown to be directly proportional to the bicarbonate/carbonic acid ratio (Henderson-Hasselbalch equation). Of the several agencies which control this ratio probably the most important is the kidney. The renal defense of metabolic alkalosis is effective because of the high bicarbonate/carbonic acid ratio which exists at an elevated pH and which permits a great increase in the base-bicarbonate excretion with but slight rise in urinary pH. When sodium depletion exists in association with alkalosis, as occurs following vomiting, the potassium, calcium, and magnesium released from their large body pools in defense of osmolarity are used in large quantities for the excretion of a basic urine. Thus, reduction of plasma pH is achieved by the excretion of basic phosphate, basic organic acids, fixed anions, and bicarbonate with fixed base instead of ammonium at the expense of extensive potassium, calcium, and magnesium loss. In the defense of metabolic acidosis, sodium (and bicarbonate) is preserved by the excretion of organic acids and phosphates at a low pH, the replacement of fixed base by ammonium, the increased excretion of chloride, and the increased reabsorption of sodium. Alteration of carbonic acid by primary changes in respiration is usually compensated for by one of the above mechanisms. Excessive loss of chloride or of potassium, calcium, and magnesium in compensation for

(6) Gamble, J. L., and McIver, M. A.: Effects of pyloric obstruction in rabbits. J. Clin. Investigation 1: 531-545, Aug. 1925.

alterations in the bicarbonate/carbonic acid ratio may result in persistent deficits after pH restoration.

Respiratory compensation through decrease or increase in the excretion of carbonic acid will prevent change in pH despite alteration in bicarbonate within wide limits. Usually no change in pH will occur until the lower limit of ventilation required to prevent anoxia or the upper limit of ventilation is exceeded.

The third factor in the control of the bicarbonate/carbonic acid ratio is the previously discussed sodium shift between extracellular and intracellular fluids. Increase or decrease in extracellular sodium available to form bicarbonate immediately results in a corresponding change in intracellular sodium with a resultant diminution in the alteration of extracellular bicarbonate. Gradual renal compensation for this shift may, however, produce a persistent opposite alteration in bicarbonate as previously noted.

In addition to the bicarbonate buffer system, extracellular and intracellular proteins act as buffers of pH. Large alterations in protein valency, and thus in the combining power for base, are associated with slight changes in pH and thus help to limit pH alteration. Failure of these mechanisms for the control of pH is associated with renal or respiratory diseases and with rapid, excessive alterations in the various ions which determine plasma bicarbonate concentration. When renal disease exists, ammonium production is decreased, the ability to perform the osmolar work of sodium reabsorption is reduced (particularly in association with the polyuria necessitated by impaired urea excretion, proteinuria, glycosuria, or a fixed specific gravity), and phosphate and sulfate ion retention occurs. Each of these deficits tends toward the reduction of extracellular bicarbonate and thus markedly hampers renal defense of metabolic acidosis. the therapy of metabolic acidosis in the presence of renal insufficiency must be cautious lest restoration of renal function and the administration of alkaline solutions produce overcorrection and metabolic alkalosis.

Respiratory disease may be associated with failure of pH control because of the inability of the kidney without respiratory assistance to maintain the normal bicarbonate/carbonic acid ratio. Pulmonary emphysema is rarely associated with sufficient elevation of carbonic acid to cause a fall in pH, but excessive loss of carbonic acid caused by the hyperventilation of encephalitis, bronchiolitis, or salicylate intoxication may alter pH despite the increased renal excretion of base.

The maintenance of an excessive shift of sodium into the intracellular fluid requires an increased level of extracellular bicarbonate through renal control. As this mechanism for the control of osmolarity takes precedence over the control of pH, the kidney, under these circumstances, may produce an alkalosis which will persist until the restoration of intracellular potassium permits the reduction of intracellular sodium.

The maintenance of extracellular osmolarity requires a complemental relationship between bicarbonate and chloride ions, and thus the alteration in bicarbonate produced by the maintenance of an intracellular-extracellular sodium shift is accompanied by a reciprocal alteration in chloride (renal compensation). The extracellular chloride concentration thus bears a direct relationship to intracellular potassium concentration and is a fairly good measure of the latter. This has been frequently demonstrated in the hypochloremia associated with primary potassium loss, excessive sodium administration, alkalosis, et cetera, if renal function is adequate, but such changes in chloride are important solely because they are associated with complemental changes in bicarbonate and pH.

The case history of a boy with severe fluid and electrolyte imbalance consequent to vomiting of psychic origin illustrates the principles which have been discussed.

CASE HISTORY

Following 2 weeks of vomiting and decreased fluid intake, a 7-year-old boy was given dextrose in water parentemally but no electrolytes. Thereafter, he became stuporous, convulsed, showed evidence of marked renal insufficiency, and only gradually returned to normal after intensive electrolyte replacement therapy.

Stage 1—effective compensation. Consequent to inadequate fluid and electrolyte intake and their loss in vomiting and by normal expenditures, extensive depletion of these substances occurred, but for a long time compensatory mechanisms were effective in maintaining normal plasma volume, osmolarity, and pH. Compensation for plasma volume loss and extracellular hyperosmolarity was accomplished by a fluid shift from the interstitial to the intravascular phase and by a more gradual shift from the intracellular to the extracellular compartment. The latter occurred because of the increased osmolarity of the hypertonic extracellular fluid, the catabolic loss of protein, and the withdrawal of potassium from the intracellular fluid.

In addition to the water transfer from the intracellular to the extracellular compartment, osmolarity was maintained by a shift of sodium. Until the hyperosmolarity of the extracellular compartment was adequately reduced, sodium was transferred from the extracellular to the intracellular fluid, but following marked sodium loss maintenance of extracellular osmolarity required a shift of sodium back to the extracellular compartment. Thus, the sodium shift was a sensitive and effective stabilizer of extracellular osmolarity. Decrease in the potassium content of the intracellular fluid occurred consequent to inadequate intake, loss in gastric fluid, and chiefly, to increased urinary excretion. This latter was consequent to protein loss and the reduction of intracellular osmolarity necessitated by water transfer to the extracellular compartment.

The increase in extracellular bicarbonate consequent to chloride loss was effectively compensated for by the increased renal excretion of potassium, calcium, and magnesium in a basic urine. In addition, the development of ketosis associated with inadequate carbohydrate intake and the decrease in renal function consequent to inadequate water intake compensated for bicarbonate elevation by increasing fixed anion concentration. The early sodium shift from the extracellular to the intracellular compartment also helped to decrease extracellular bicarbonate concentration. In addition to these mechanisms for the reduction of bicarbonate, decreased ventilation with retention of carbonic acid maintained the bicarbonate/carbonic acid ratio at a normal level. Thus, compensation was effective in maintaining plasma volume, osmolarity, and pH at the expense of extensive loss of extracellular and intracellular volume, water, sodium, potassium, and chloride.

Stage 2.—failure of compensation. Because of the development of cellular damage consequent to the excessive shift of intracellular water or the sudden increase in extracellular water loss, plasma volume could no longer be maintained and signs of shock appeared. Extracellular osmolarity was sacrificed in order to maintain plasma volume through the dilution of extracellular electrolytes by the transferred intracellular water. Normal pH might still have been maintained despite the bicarbonate elevation consequent to chloride loss by the effects of ketosis and the renal failure associated with reduction in plasma volume.

Stage 3—correction with water and dextrose. At another hospital, large amounts of water and dextrose without electrolyte were administered to correct the loss of plasma volume. This was successfully accomplished at the expense of further reduction in extracellular osmolarity. Renal function could not be adequately restored because of inadequate base for the excretion of water and thus the administered water was shifted from the already hypotonic extracellular to the intracellular compartment resulting in marked cellular hyperhydration and hypoosmolarity (7). Because of the excessive retained water, mild edema became clinically apparent. No change in pH occurred although ketosis was corrected by the administration of dextrose. Poor renal function compensated for the chloride loss. If sodium and chloride had been administered at this time, as is usual in the treatment of vomiting, renal function would have been restored and excessive intracellular hypoosmolarity averted, but with the restoration of renal function and loss of ketosis, marked elevation of bicarbonate and alkalosis might have immediately resulted. Bicarbonate elevation would have been maintained by renal function in order to maintain the elevated intracellular sodium concentration necessitated by potassium loss and thus alkalosis might have persisted despite chloride restoration and return of renal function.

(7) Stewart, J. D., and Rourke, G. M.: Effects of large intravenous infusions on body fluid. J. Clin. Investigation 21: 197-205, Mar. 1942.

Stage 4—correction with electrolytes. When this child was first seen, his plasma volume had been partially restored and his pH was normal, but the marked disturbance of intracellular and extracellular osmolarity was evidenced by renal insufficiency, hypertension, edema, coma, and repeated convulsions with long periods of apnea and cyanosis. His urine was scanty and showed 3 plus albumin. The blood nonprotein nitrogen was 161 mg. per 100 cc., and the creatinine was 7.9 mg. per 100 cc. The carbon dioxide combining power was essentially normal and the plasma pH was 7.35. The plasma chloride of 68.2 mM. per liter and a plasma sodium of 136 mM. per liter, indicated that a large increase in other anions (sulfate, phosphate, and organic acid) was also present. The plasma potassium was 3.7 mM. per liter and the plasma calcium was 10.3 mg. per 100 cc. With the plasma hypoosmolarity the total plasma volume was markedly reduced as indicated by the red blood cell count of 6.2 million. As pH, potassium, and calcium levels were not markedly altered, it can be assumed that marked intracellular and extracellular hypoosmolarity accounted for the central nervous system manifestations and the renal failure.

Early rapid administration of sodium chloride and of potassium, calcium, and magnesium in as large amounts as could be tolerated produced restoration of intracellular and extracellular osmolarity and rapid return of renal function with cessation of convulsions and respiratory dysfunction. About 4 days elapsed before the plasma volume, plasma nonprotein nitrogen, sodium, and chloride levels were restored to normal. No significant alteration in pH was noted at any time. The administration of potassium, magnesium, and calcium undoubtedly prevented persistent pH elevation and the tetany which is frequently associated with the post-therapeutic shift of these ions to the intracellular pools. By the eighth hospital day the urine, blood pressure, plasma electrolyte values, and the renal function were entirely normal. The adrenal effect which had achieved retention of sodium and maintained extracellular fluid volume at the expense of a large potassium loss was evidenced by an initial lymphopenia and an absence of eosinophils.

The return of normal cerebral function was markedly delayed. The child was irrational with extreme emotional lability until the end of the first hospital week. While he was receiving 5 grams of potassium chloride in addition to a normal diet, the hypotonia, weakness, generalized areflexia, and irrationality disappeared, but electroencephalographic evidence of cerebral damage, though markedly improved, was still present more than 3 months later.

CONCLUSIONS

In fluid therapy it is important to restore the plasma volume, normal osmolarity, and normal pH in that order but as these factors are closely interrelated, consideration must be given to the restoration or main-

tenance of all three simultaneously. The following pattern for parenteral fluid administration is suggested:

1. The restoration of plasma volume with intravenous administration of blood, plasma, or hypertonic dextrose solutions.

2. The restoration of extracellular osmolarity by the intravenous administration of either hypertonic, isotonic, or usually hypotonic (dependent on the initial osmolar alteration) sodium solutions such as Ringer's lactate solution.

3. The restoration of pH by the intravenous administration of 1/6 molar sodium lactate or sodium chloride solutions (dependent on the initial alteration). The amount of sodium administered as replacement should not exceed 12 mM. per Kg. of body weight.

4. The restoration of intracellular osmolarity (as soon as renal function is reestablished) by the intravenous or subcutaneous administration of potassium-containing solutions. The maximum safe dose is 3 mM. potassium per Kg. of body weight per day.

5. The replacement of the calcium and magnesium deficit with calcium gluconate given intravenously and magnesium sulfate given intramuscularly.

6. Compensation for water, sodium, chloride, potassium, dextrose, protein, and vitamin expenditures during 24-hour periods by intravenous, subcutaneous, or oral administration.

7. Early resumption of oral intake should be attempted. Potassium intake must be kept high.

The dangers of fluid therapy should be considered and avoided.

Presacral Neurofibroma

George Alvary, *Major, U. S. A. F. (MC)* (1)

NEUROFIBROMA is one of a large variety of tumefactions that may be attached to the anterior surface of the sacrum. These presacral or retrorectal tumors present an interesting problem that frequently requires the combined skills of the surgeon, urologist, gynecologist, radiologist, and pathologist for their diagnosis and management. The classification and treatment of these lesions has been well presented in 2 recent reviews (2,3). Presacral tumors are rare. At the Mayo clinic they occurred only about once in every 10,000 female patients (3). The case here reported brought up several interesting problems that will no doubt face other surgeons who operate on tumors in this region

CASE REPORT

A 26-year-old married woman was admitted to the hospital on 31 January 1951 complaining of backache and pains of 5 months' duration radiating down the back of her right thigh. Her children, 3 years and 20 months old respectively, were both born without complications. Records of these deliveries contained no mention of the presence of a pelvic mass.

Her blood pressure on admission was 96/60. Pelvic examination revealed a mass the size of an orange, protruding from the anterior surface of the sacrum into the pelvis for a distance of about 7 cm. The mass was firm and somewhat tender. Its uppermost point was just below the sacral promontory. The mass was definitely retroperitoneal and was firmly attached to the sacrum. The rectum and sigmoid were freely movable as were the uterus and adnexa which were pushed forward and to the left by the tumor. A roentgenogram of the sacrum (figs. 1 and 2) revealed a large defect on the right side that extended across the midline to the opposite ilium. The bony margin of this defect was smooth but loculated. There were no calcium deposits to indicate a teratoma. A barium enema revealed the rectosigmoid displaced somewhat to the

(1) Westover Air Force Base, Mass.

(2) Jackman, R. J.; Clark, P. L., III, and Smith, N. D.: Retrorectal tumors. J. A. M. A. 145: 956-962, Mar. 31, 1951.

(3) Lovelady, S. B., and Dockerty, M. B.: Extragenital pelvic tumors in women. Am. J. Obst. & Gynec. 58: 215-236, Aug. 1949.

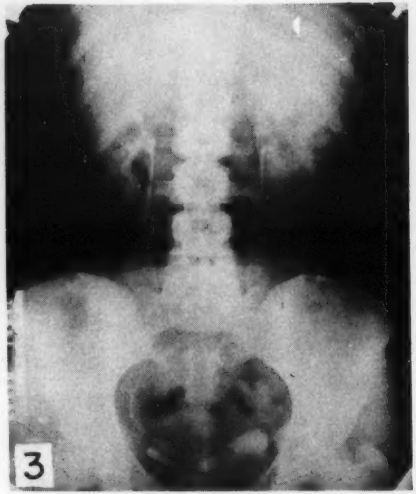


Figure 1. Anteroposterior roentgenogram of the sacrum. The smooth outline of the defect is seen extending across the midline, mostly on the right side. Figure 2. Oblique roentgenogram of the sacrum. The bony defect shows several punched-out areas. The undermined area beneath the promontory is pointed out by arrows. The roof of this cavity represents the "raw" surface of bone facing downward during operation. Figure 3. Excretory pyelogram demonstrating the lateral displacement of the right ureter and compression of the bladder by the large retroperitoneal neurofibroma.

left. An intravenous pyelogram (fig. 3) revealed good excretory response on both sides. The renal architecture showed a doubling of the left ureter in its upper two-thirds. The right ureter showed a definite posterolateral deviation in its distal portion, consistent with the pressure of a mass extending from the right sacral area.

A diagnosis of presacral tumor was made and an exploratory laparotomy was performed. Once it was ascertained that we were not dealing with an ectopic pelvic kidney, it was planned to take a specimen for biopsy and, if warranted by gross appearance and frozen section, to perform an immediate resection and if the frozen section should prove inconclusive, to delay further treatment until the final report became available.

The abdomen was entered through a right paramedian incision from the umbilicus to the symphysis. There was no free fluid in the abdomen and the tumor was found to be entirely retroperitoneal. To gain exposure, the posterior peritoneum was opened over a distance of 10 cm. from the bifurcation of the aorta to the bottom of the cul-de-sac. The tumor was a roughly globular mass of rubbery consistency, contained in a thick, fibrous capsule which was firmly adherent to the sacrum. The cut surface was light brown. The pathologist present declined to make a definite diagnosis. Because of the extreme vascularity about the tumor, it appeared doubtful whether the bleeding could be controlled after an attempted removal. After a small piece of the tumor had been removed,

Figure 4. Gross specimen showing the lobulated encapsulated free surface of the tumor protruding into the pelvis.

hemostasis was secured with fibrin foam and suture ligatures through the capsule. Despite all precautions, it is estimated that from this relatively minor procedure the patient lost between 500 and 700 cc. of blood which was replaced during the operation.

The specimen was sent to the First Army Laboratory which reported a "benign tumor, presumably of neurogenic origin." The specimen was also shown to Dr. Arthur Purvy Stout of Columbia University who reported it as "presumably neurofibroma."

Twelve days later the tumor was resected through a left paramedian incision. The posterior peritoneum was opened from the level of the bifurcation of the aorta down to the bottom of the pouch of Douglas. This exposed the tumor capsule. The tumor extended from the sacral promontory to the sacrococcygeal articulation, reversing by its bulge the normal convexity of the sacral hollow. It was possible to shell this tumor out of its capsule to which it adhered only by a few trabeculas that were divided by finger dissection. The capsule itself was firmly fused with the periosteum of the sacrum but there was no evidence of invasiveness. The proximal portion of the tumor had undermined the sacrum to a distance of 2.5 cm. above the level of the promontory by a cephalad extension within the body of the fifth lumbar vertebra. This is a rather typical finding in presacral neurofibroma and has been described by most surgeons who have operated on these tumors. After removal this resulted in an area of "raw bone" from which blood oozed freely.

Figure 5. Gross specimen showing the posterior surface which was attached to the sacrum. Note the bare convolutions of the tumor devoid of capsule.

Figure 6. Sagittal section through the specimen. The free surface is shown above and the surface attached to the sacrum below. The solid central portion is surrounded by irregular convolutions.

With the patient lying on her back this surface faced downward and hemostasis except by packing was extremely difficult. Inspection of the tumor bed showed removal of the tumor to be complete. Oozing was finally controlled with fibrin foam and gelfoam pledgets saturated in thrombin solution. The tumor was an avascular, yellow-brown, solid mass and weighed 185 grams (figs. 4, 5, and 6).

At this point the question came up whether to close the peritoneum by simply approximating the posterior cut edges or whether it would be better to pack the newly created space (the tumor bed and the "raw" sacral defect), a potential postoperative bleeding hazard, allowing the gauze to protrude through a posterior colpotomy for subsequent removal.

The former procedure would result in a quick accumulation in the tumor bed of blood that would clot and eventually be absorbed. Packing would prevent the formation of any large dissecting hematoma with possible infection or leakage into the general peritoneal cavity. On the other hand it would be difficult to insure against the pressure effect of the pack on the nerves of the sacral plexus that emerge in that area. Furthermore, the packs would have to be removed, presumably under anesthesia. It was decided to close the posterior peritoneum tightly and without drainage.

During the second operation the patient lost about 2,500 cc. of blood which was replaced immediately. She stood the procedure well and was discharged from the hospital on the thirteenth postoperative day.

Examination 1 week after operation revealed a large, firm hematoma occupying the former site of the tumor. Six weeks later this had diminished to nearly one half its original size and 6 months later was no longer palpable. Although the patient showed no weakness of the muscles of her lower extremities, she complained of patchy areas of tingling and examination showed corresponding areas of hypesthesia on the inner aspect of the right thigh and posterior surface of the right calf.

The pathologist reported a discoid, rubbery tumor which weighed 182 grams and measured 11.4 cm. inferosuperiorly, 6.7 cm. laterally, and 6 cm. anteroposteriorly. When viewed anteroposteriorly (fig. 4) it had an oval outline but the lateral view revealed it to be crescent-shaped with its convexity on the anterior surface. The anterior and lateral surfaces were slightly lobulated and bore a thin, transparent capsule through which a light tan tissue could be seen. The posterior surface (figs. 5 and 6) was irregular, bore no capsule and revealed a golden tan tissue. Microscopic examination showed the tissue to be composed of spindle-shaped cells containing fusiform nuclei and displaying indistinct cellular borders. In many fields the tissue formed a whorllike pattern which gave it the histologic pattern of the so-called Verocay bodies. In other areas the stroma was composed of foamy macrophages, a finding interpreted as evidence of degeneration of the tumor mass. No evidence of malignant change was encountered.

DISCUSSION

The symptoms of presacral tumors are vague. Backache is the most common complaint. Pain in the leg and bladder and bowel dysfunction are less common. Paresthesias and difficulty in walking occasionally occur. Hemorrhoidectomies were performed on 5 patients of Jackman's series *(2)*. Others were operated on for "ovarian cysts." Physical findings are often not diagnostic as to the type of tumor. The diagnosis has to be decided by the pathologist. From the pathologic point of view these lesions may be classified as congenital, neurogenic, osseous, and miscellaneous *(2)*.

By far the most common of these lesions fall into the first category associated with an ectopic kidney. The recognition of such a kidney is extremely important. Herring *(2)* reported a patient whose retroperitoneal mass was removed. It proved to be a kidney and the only one the patient had. This would not have occurred if the preoperative diagnosis had included a urogram. One should bear in mind the frequency of this anomaly and confirm the diagnosis by urography rather than by a surgical operation. All the teratomas except in Jackman's series *(2)* proved to be benign. Complete enucleation without spillage is required for successful treatment. Anterior sacral meningocele, a rare lesion, is probably best treated by the neurosurgeon.

The neurogenic group comprises neurofibromas, ependymal cell gliomas, ganglioneuromas, and ependymoblastomas. The most common of these, the neurofibromas, are usually seen in young women whose ages range from 17 to 35 years (3). Being symptomless they are frequently discovered accidentally. Some are found to arise from the obturator nerves and others from the anterior sacral nerves. In some it is difficult to ascertain the nerve of origin. The tumors average about 9 cm. in diameter and are encapsulated and yellow. "One neoplasm was dumbbell in appearance, protruding from the left obturator foramen, exhibiting large intra-pelvic and extra-pelvic portions and its operative removal had to be done in stages. Another patient, believed originally to present a similar situation, gave a history of having undergone two operative attempts at removal. The residual mass was very difficult to enucleate and the patient is believed to be now suffering from recurrence. In still another patient, the adherence to surrounding tissues of a large, pelvic neurofibroma was responsible for such serious hemorrhage at removal that the patient died shortly after operation" (3).

Reports such as these made us hesitant and perhaps overcautious in the matter of whether or not to remove this tumor at the first exploration. In order to prevent recurrences a complete removal of these tumors is essential, especially as some of them recur locally although they are classified as benign. Because of the vascularity of the area immediately surrounding the tumor as well as the raw surface of sacral bone which has to be left behind, it is well to anticipate a large loss of blood and to have plenty of blood available for transfusion during operation. The ependymomas represent unusual extensions of gliomas of the spinal cord and treatment of these extensive growths is unsatisfactory.

Lesions arising in bone are the benign giant cell tumor, the cartilaginous and osteocartilaginous groups, osteogenic sarcoma, Ewing's tumor, and chordoma. In all of these except slow-growing tumors exhibiting an admixture of bone and cartilage the prognosis is poor.

The miscellaneous group consists of inflammatory masses often secondary to anal fistulas, fibromas, and metastatic carcinomas. The treatment of most of these is surgical removal. Roentgen radiation and radium are important aids in the treatment of these tumors. Hemorrhage, usually from the presacral plexus of veins, constitutes the greatest hazard associated with complete removal. Interesting problems arise when these tumors are complicated by pregnancy. It is usually not advisable to perform a therapeutic abortion on patients with these tumors because most of them are benign and those that are malignant, with a few exceptions, grow slowly. Their rate of growth is not affected by pregnancy. If the tumor is believed to be large enough to obstruct labor it is best to allow the pregnancy to proceed to term and to perform a cesarean section. Subsequent removal of the tumor can then be carried out.

971621 O - 51 - 9

BOOK REVIEW

Inhalation Anesthesia, A Fundamental Guide, by *Arthur E. Guedel,* M. D., Associate Clinical Professor of Surgery (Emeritus), University of Southern California School of Medicine. 2d edition. 143 pages. The Macmillan Co., New York, N. Y., publisher, 1951. Price $3.75.

In this new edition, the author has successfully improved on a monograph which for many years has been accepted by teachers and students in the field of anesthesia as a standard text. By the inclusion of many of the advances made in the last 15 years, he has brought his book up to date and has, at the same time, retained the concise and simple descriptions for which it has been acclaimed since its first printing. The introductory chapter has been revised to include a brief discussion of the physical laws which serve as the basis for the successful administration of inhalation anesthesia. The use of premedicant drugs is also discussed in the light of their pharmacologic background. As in the first edition, the section describing the signs of anesthesia is a classical presentation of this vital aspect of the subject. In the revision, however, the author has increased the value of this section by including variations in the signs of anesthesia which have occurred as a result of the introduction of new drugs such as cyclopropane, barbiturates, and curare. Newer technics such as the use of endotracheal catheters and the closed system carbon dioxide absorption apparatus are mentioned and their fields of application indicated. The chapters devoted to complications and accidents during anesthesia have been revised to include descriptions of such recently developed procedures as cardiac resuscitation and the use of intravenous procaine in the treatment of cardiac arrhythmias. The use of curare, topical anesthesia, and endotracheal intubation in the prevention and treatment of respiratory complications is also included. Anesthetic explosions are fully discussed in the light of recent information concerning the factors responsible for these accidents.

Extraneous detail is carefully avoided and a conscientious attempt is made to present material of value to those engaged in the clinical practice of anesthesia. The revisions found in this new edition clearly point out the trend away from the "art of anesthesia" toward the science of anesthesiology.—*Maj. H. P. Makel, MC, U. S. A.*

The Clinical Effects of Delta 5 Pregnenolone in Rheumatoid Arthritis[1]

Alton R. Higgins, *Captain, MC, U. S. N.*
Richard E. Jones, Jr., *Lieutenant, junior grade, MC, U. S. N. R.*
Thomas W. D. Smith, *Lieutenant, junior grade, MC, U. S. N.*

FOLLOWING the spectacular clinical improvement in rheumatoid arthritis which followed the administration of cortisone by Hench et al. *(2)*, a number of other steroids have been investigated in the therapy of this disease. Among these, delta 5 pregnenolone has been used in the treatment of rheumatoid arthritis with variable reports as to its value.

Davision and Koets *(3)* observed a decrease in 17-ketosteroid excretion following the administration of pregnenolone in patients with rheumatoid arthritis. Subsequently, Davison et al. *(4)* reported improvement in most patients with rheumatoid arthritis following the intramuscular injection of from 100 to 300 mg. of pregnenolone daily, improvement usually occurring within from 3 to 7 days, and with complete regression of symptoms and disappearance of objective findings in from 2 to 4 weeks. Cohen et al. *(5)* observed clinical improvement in 8 of 9 patients with rheumatoid arthritis treated with pregnenolone alone, and in 93 percent of 31 patients treated with pregnenolone, or with pregnenolone

(1) From the Metabolic Research Facility, U. S. Naval Hospital, Oakland, Calif.

(2) Hench, P. S.; Kendall, E. C.; Slocumb, C. H.; and Polley, H. F.: Effect of hormone of adrenal cortex (17-hydroxy-11-dehydrocorticosterone; compound E) and of pituitary adrenocorticotrophic hormone on rheumatoid arthritis. Proc. Staff Meet., Mayo Clin. 24: 181, 1949.

(3) Davison, R. A., and Koets, P.: Effect of delta 5 pregnenolone on urinary 17-ketosteroid excretion and symptomatology of ankylosing spondylarthritis; preliminary report. Ann. Rheumat. Dis. 8: 305, Dec. 1949.

(4) Davison R.; Koets, P.; Snow, W. G.; and Gabrielson, L. G.: Effects of delta 5 pregnenolone in rheumatoid arthritis. Arch. Int. Med. 85: 365, Mar. 1950.

(5) Cohen, A.; Goldman, J.; and Dubbs, A. W.: The use of pregnenolone and combined steroids in the treatment of rheumatoid arthritis. J. Philadelphia Gen. Hosp. 1: 120, Oct. 1950.

combined with other steroids, including testosterone, progesterone, desoxycorticosterone, and estradiol. In 73 percent of this group, complete remission or major improvement was reported. The results obtained by these authors were considered to be "similar though less spectacular to those obtained with cortisone and ACTH and without their untoward side effects." Smith (6) reported the results of the oral or intramuscular administration of pregnenolone to 95 patients with rheumatoid arthritis, and concluded that "pregnenolone is of relatively little value in the treatment of rheumatoid arthritis." No important side effects have been reported following the use of pregnenolone.

This report concerns clinical observations on 16 patients hospitalized with rheumatoid arthritis and spondylarthritis, 7 of whom were used as placebo controls in a "double blind" type of clinical experiment. We are not aware of previous reports of controlled observations of the clinical effects of pregnenolone in rheumatoid arthritis.

TABLE 1. *General features of patients included in the study*

Group	Case	Age	Duration of disease	Functional capacity*	Days of treatment
A**	1	41	12 yr.	I	56
	2	20	11 mo.	II	24
	3	34	5 yr.	II	56
	4	19	2 mo.	II	42
	5	19	7 mo.	II	21
	6	32	4 yr.	II	14
	7	22	1 yr.	II	56
	8	22	1 yr. 7 mo.	III	35
	9	54	1 yr. 6 mo.	IV	56
B***	10	26	2 yr.	I	56
	11	31	7 yr.	II	56
	12	22	3 mo.	II	28
	13	22	8 mo.	III	56
	14	21	9 mo.	III	56
	15	62	5 yr.	III	56
	16	59	20 yr.	IV	56

*See table 2.
**Treated with pregnenolone
***Treated with placebo

MATERIAL

The 16 patients included in this study were male naval personnel or veterans with rheumatoid spondylarthritis or rheumatoid arthritis. Ages, duration of disease, functional capacity, days of treatment with the agent or placebo are given in table 1. The ages of the patients ranged from 19 to 62 years and the duration of the disease was from

(6) Smith, R. T.: Testosterone, pregnenolone and irradiated ergosterol in treatment. Philadelphia Med. 45: 1201, Apr. 8, 1950.

2 months to 20 years. The functional capacity of the patients, classified according to the therapeutic criteria adopted by the American Rheumatism Association (7), is shown in table 2.

TABLE 2. *Functional capacity of 16 patients with rheumatoid arthritis*

Class	Functional capacity	Number of patients
I	Complete; capable of usual activities without handicap	2
II	Adequate for normal activities despite discomfort or limited motion	7
III	Limited; capable of little or none of usual activities or self-care	5
IV	Largely or wholly incapacitated; in wheel chair or bed, little or no self-care	2

METHODS

The study was designed as a "double blind" experiment, using the technics described by Greiner et al. (8) with certain modifications necessitated by a study of this type. The patients were divided into into two groups and "pairing" of the patients as to severity of disease was attempted insofar as possible. Nine patients in group A each received a total of 100 mg. of pregnenolone given orally before each meal and 200 mg. at bedtime. Seven patients in group B each received an inert placebo consisting of lactose, gelatin, and sodium stearate in a dosage schedule the same as that of the treated group. The placebo was indistinguishable from the agent tested, and was not identifiable to the patient, physicians, or ward attendants, the key being kept by the pharmacist who prepared the ward drug issues.

The patients were placed on a regular hospital diet. Moderate activity about the hospital was encouraged. No therapy except simple physiotherapy and analgesics was given in addition to the test agents. The study included a therapy period of 56 days. Several patients dropped out of the study and several were added after the project was under way so that all patients did not receive 56 days of the agent or placebo.

The "daily report-card" technic described by Greiner et al. (8), with modification, was used as a continuous subjective estimate of clinical effect. These data were analyzed weekly and cumulatively. Clinical evaluation of the patients was made prior to, during, and following therapy. For this evaluation the physicians had at hand,

(7) Steinbrocker, O.; Traeger, C. H.; and Batterman, R. C.: Therapeutic criteria in rheumatoid arthritis. J. A. M. A. 140: 659-662, June 25, 1949.

(8) Greiner, T.; Gold, H.; Cattell, M.; Travell, J.; Bakst, H.; Rinzler, S. H.; Benjamin, Z. H.; Warshaw, L. J.; Bobb, A. L.; Kivit, N. T.; Modell, W.; Robthendler, H. H.; Messeloff, C. R.; and Kramer, M. L.: Method for evaluation of effects of drugs on cardiac pain in patients with angina of effort; a study of khellin (visammin). Am. J. Med. 9: 143-155, Aug. 1950.

TABLE 3. *Weekly analysis of report-card data*

Week	Group	Pain						Patient days
		Same		Less		More		
		Number	Percent	Number	Percent	Number	Percent	
1st	A	25	59.5	8	19.1	9	21.4	42
	B	34	81.0	1	2.4	7	16.6	42
2nd	A	21	50.0	14	33.3	7	16.7	42
	B	29	69.0	3	7.1	10	23.9	42
3rd	A	18	42.9	17	40.5	7	16.6	42
	B	26	61.9	9	21.5	7	16.6	42
4th	A	22	45.0	11	22.4	16	32.6	49
	B	35	71.5	10	20.4	4	8.1	49
5th	A	22	53.7	9	21.9	10	24.4	41
	B	27	56.2	14	29.2	7	14.6	48
6th	A	18	42.9	15	35.7	9	21.4	42
	B	31	63.3	12	24.5	6	12.2	49
7th	A	23	54.7	7	16.7	12	28.6	42
	B	30	85.7	5	14.3	–	–	35
8th	A	29	59.2	7	14.3	13	26.5	49
	B	30	71.4	12	28.6	–	–	42
Total	A	178	51.0	88	25.2	83	23.8	349
	B	242	69.4	66	18.9	41	11.7	349

in addition to history and physical examination, roentgenograms of the affected joints, goniometry data, hemograms, urinalyses, daily temperature and pulse records, and weekly sedimentation rates.

RESULTS

Table 3 gives a weekly analysis of the "daily report-card" data of the patients in each group. During the first few weeks of therapy the treated group of patients showed a significant advantage, insofar as relief of pain was concerned, over the control group. As the period of therapy was continued, this trend declined and the totals indicated that the treated group had nearly as many patient days of more pain as they did of less pain.

Table 4 shows the response of the patients in each group to therapy. In the clinical evaluation the physicians considered "report-card" data, clinical observation, and laboratory aids on each patient. One patient in each group showed marked remission of symptoms during the period of therapy. Two patients in the treated group and one patient in the placebo control group showed moderate improvement. In the remainder of the patients no change in the disease was noted as the result of treatment. No significant advantage attends the use of pregnenolone over an inert placebo in the treatment of rheumatoid spondylarthritis or rheumatoid arthritis under the conditions of this experiment.

TABLE 4. *Response of patients to therapy*

Group	Case	Functional capacity		Clinical evaluation
		Before treatment	After treatment	
A	1	I	I	0
	2	II	I	+++
	3	II	II	0
	4	II	I	++
	5	II	II	0
	6	II	II	0
	7	II	II	0
	8	III	II	++
	9	IV	IV	0
B	10	I	I	0
	11	II	II	0
	12	II	II	0
	13	III	II	++
	14	III	III	0
	15	III	I	+++
	16	IV	IV	0

0 = No change
+ = Slight improvement
++ = Moderate improvement
+++ = Marked improvement

DISCUSSION

The evaluation of therapeutic agents in rheumatoid arthritis is made difficult by the many variables encountered such as the enthusiasm of the patient for any new form of treatment, natural remissions of the disease, and changes in environment. The disparity of results following gold therapy and other agents attests to these difficulties in evaluation. The same hazards exist in uncontrolled studies of therapeutic agents in any disease which is subject to natural remissions, if a significant effect of the agent is not observed in every case in which the agent is used. The method of the controlled placebo experiment, particularly as it has been developed and used by the Cornell group *(8)* has become essential to the study of a therapeutic material of the type here discussed. Few variables remain in this type of study if cases of comparable stage and severity of disease are paired in each group.

The remarkable clinical remission induced in rheumatoid arthritis by cortisone has naturally stimulated interest in therapy with related steroid compounds. Delta 5 pregnenolone is such a synthetic steroid compound, having a structural formula which somewhat resembles that of cortisone. Metabolically, however, it appears to produce none of the effects which result from cortisone, and the data reported herewith indicate that none of the benefits which regularly follow cortisone therapy in rheumatoid arthritis are observed with pregnenolone.

CONCLUSION

No advantage was observed in the administration of oral pregnenolone over an inert placebo in the treatment of rheumatoid arthritis under the conditions of this study.

Symmetrical Serous Synovitis[1]

Robert G. Thompson, *Lieutenant Colonel, MC, A.U.S.*

Carl Z. Berry, *Lieutenant Colonel, U.S.A.F. (MC)*

SYNOVITIS of the knees in patients with congenital syphilis is a well-known sign of the disease. The condition, although mentioned by other writers, was not fully described until 1886 at which time Clutton[2] wrote: "I have never seen both knee joints filled with fluid causing scarcely any pain or discomfort, whilst other joints remain quite free from any signs of inflammation except in cases where there were complete evidences either past or present of hereditary syphilis." Although this type of synovitis is a valuable and frequent sign of congenital syphilis, it has not received the attention it deserves. In 1934 Klauder and Robertson[3] reviewed the subject in detail and emphasized the frequency with which this condition is associated with interstitial keratitis. The purpose of this article is to stimulate an awareness of the disease in order that these patients will be observed more carefully for the early signs of interstitial keratitis which follow so frequently in the wake of the knee complaints.

CASE REPORT

A 23-year-old white soldier was admitted to a military hospital on 16 August 1949. His chief complaint was a painless swelling of the left knee which began in June 1949. There had been no trauma to the knee. Treatment as an outpatient with physiotherapy and supportive bandages had been ineffective in reducing the swelling. At the time of his admission his Kahn test was positive in a titer of 80 units. A diagnosis of bursitis, acute, nonsuppurative, left knee, was made and the patient was transferred to another installation without treatment.

He had been in good health until his induction into the Army in February 1949 except for pneumonia at age 15 and frequent sore throat. In January 1948 it was discovered that his serologic test for syphilis

[1] From Walter Reed Army Hospital, Washington, D. C.

[2] Clutton, H. H.: Symmetrical synovitis of knee in hereditary syphilis. Lancet 1: 391, 1886.

[3] Klauder, J. V., and Robertson, H. F.: Symmetrical serous synovitis (Clutton's joints); congenital syphilis and interstitial keratitis. J. A. M. A. 103: 236-240, July 28, 1934.

(STS) was positive. During the period 4 January to 25 March he received 4,800,000 units of penicillin, 10 intramuscular injections of a bismuth compound, and 10 injections of mapharsen. On 18 April his STS was negative. Additional negative tests were obtained at the time of his induction. He denied signs and symptoms of syphilis. His father is alive and well and has a negative STS. His mother died at age 57 of a heart attack. Her serologic status is unknown. Two brothers died in infancy and a sister died at age 17, all of unknown cause. There were no other siblings.

The physical examination was negative except for the left knee which showed a moderate, slightly painful swelling. There was no crepitation and movement of the joint was not restricted or painful. No stigmata of congenital syphilis were recognized at that time. The upper central incisors had been replaced by a prosthesis. A roentgenogram of the left knee was negative except for an increase in the subpatellar space. The Kahn test was positive in a titer of 20 units. The sedimentation rate was 23. Twenty cubic centimeters of straw-colored fluid were aspirated from the knee. It contained an occasional white blood cell and no organisms on smear or culture. All other tests were negative.

TABLE 1. *Fever therapy schedule*

Period	*Method*	*Hyperpyrexia*
12 to 14 December 1949	Hypertherm	Maximum temperature 104°F. 5½ hours above 100°F.
23 December to 3 January 1950	Typhoid vaccine intravenously	Five treatments. 8¼ hours above 100.6°F.
18 January to 10 February 1950	Tertian malarial therapy	Twelve paroxysms produced 60¼ hours above 103°F.

The swelling of the left knee persisted. No cause had been recognized for the hydrarthrosis and physiotherapy was continued. On 11 October 1949 treatment with 100,000 units of penicillin every 3 hours was begun. On 18 October it was noted that the right knee was swollen and nontender. Penicillin therapy was completed on 22 October, a total dose of 9,600,000 units having been received. On 28 November the patient complained of burning and lacrimation of the left eye. Ophthalmologic examination revealed an active interstitial keratitis. Visual acuity could not be determined because of photophobia. The patient was then transferred to this hospital for fever therapy which was given as shown in table 1. The patient was observed for 9 months following therapy. The swelling in his knees (fig. 1) completely disappeared and roentgenograms showed no abnormalities. Mild residual scarring remained in the left cornea (fig. 2). On 15 September 1950 acute interstitial keratitis developed in the *right* eye.

Figure 1. *Photograph taken on 12 January 1950 showing mild nonsymptomatic bilateral symmetrical swelling of the knees.*

Figure 2. *Photograph taken on 12 January 1950 showing severe interstitial keratitis of the left eye.*

DISCUSSION

Symmetrical serous synovitis refers to a painless hydrarthrosis which usually involves both knees but occasionally may be unilateral. Other joints may be involved. In 63 patients with the disorder described by Klauder and Robertson[3] the knee was involved in all and 2 patients had a concomitant involvement of the elbow. Wrist, finger, and ankle involvement have been recorded but are rare. The process is almost invariably painless and apart from the swelling usually gives no indication of its presence. Occasionally there is stiffness of the joint and slight pain or limp. The swollen joint is distended with fluid but is not tense and on palpation gives a sensation of flaccid fluctuation. The swelling extends above the patella. There is no evidence of inflammation about the joint and movement is free except for slight limitation when there is an excess of fluid. There is no atrophy of the musculature and the overlying skin is normal in appearance.

A synovitis is the primary and most important pathologic process. The process is seen for the most part in children with congenital syphilis although hydrarthrosis in adults with acquired syphilis has been described by Wile and Senear[4] and others. Most patients with symmetrical serous synovitis are between the ages of 8 and 15 years. The oldest patient in Clutton's series was 20 years old. A 35-year-old patient has been reported[3].

Klauder[5] in discussing Hutchinson's opinions and teachings emphasized the striking similarity between symmetrical synovitis and interstitial keratitis. Both conditions are characteristic of congenital syphilis and occur most frequently in the same age group. The involvement is unilateral at first in each condition and an interval of time elapses before symptoms occur on the opposite side. Both processes pursue a chronic course and produce little or no destructive changes in the tissues. The response to treatment in both is disappointing. Symmetrical synovitis like interstitial keratitis may appear on the opposite side after the administration of antisyphilitic treatment. Various authors[6-8] have emphasized the appearance of syphilitic lesions in previously traumatized tissue. Klauder[3,9] has pointed out the frequent occurrence of both symmetrical serous synovitis and interstitial keratitis following trauma.

---

[4]Wile, U. J., and Senear, F. E.: Study of involvement of bones and joints in early syphilis. Am. J. M. Sc. 152: 689, Nov. 1916.

[5]Klauder, J. V.: Sir Jonathan Hutchinson. M. Life 41: 313-326, June 1934.

[6]Chesney, A. M.; Turner, T. B.; and Halley, C. R. L.: Studies in experimental syphilis; on localization of syphilitic lesions in inflamed areas. Bull. Johns Hopkins Hosp. 42: 319-334, June 1928.

[7]Klauder, J. V.: Syphilis and trauma, workmen's compensation act, industrial physician and syphilitic employee. J. A. M. A. 78: 1029-1037, Apr. 8, 1922.

[8]Thompson, R. G.; Leedham, C. L.; and Hailey, H.: Osteomyelitis of skull in early syphilis; report of two cases probably influenced by trauma. Am. J. Syph., Gonor., & Ven. Dis. 33: 34-42, Jan. 1949.

[9]Klauder, J. V.: Ocular syphilis; interstitial keratitis and trauma; clinical, experimental and medicolegal aspects. Arch. Ophth. 10: 302-328, Sept. 1933.

The frequency of bone and joint complaints is high in patients of military age. The importance of early diagnosis of symmetrical serous synovitis is emphasized in view of the prognostic significance of the process. It has been stated that every patient with congenital syphilis is a potential candidate for interstitial keratitis. In Klauder and Robertson's[3] series of 363 patients with congenital syphilis the incidence of symmetrical serous synovitis was 17.3 percent. They demonstrated a slightly greater incidence of this condition in patients with interstitial keratitis than in other patients with congenital syphilis. Stokes et al.[10] have also described the frequency with which symmetrical serous synovitis precedes the more serious interstitial keratitis.

SUMMARY

A 23-year-old soldier suffered an attack of interstitial keratitis which was preceded by symmetrical serous synovitis of the knees. The joint involvement antedated the eye involvement by 6 months. Early recognition of the synovitis in a congenitally syphilitic patient is a valuable prognostic sign and indicates an increased probability of later involvement of the eyes in the syphilitic process.

[10]Stokes, J. H.; Beerman, H.; and Ingraham, N. R.: Modern Clinical Syphilology 3d edition, W. B. Saunders Co., Philadelphia, Pa. 1945. p. 1133.

BOOK REVIEW

Headache, by *Louis G. Moench,* M. D., Assistant Clinical Professor of Medicine, University of Utah School of Medicine; Internist, Salt Lake Clinic, Salt Lake City, 2d edition. 217 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1951. Price $4.50.

Dr. Moench has skillfully, and in a scholarly fashion condensed all that is currently known about headache into a readable, well-illustrated, informative book. It is well organized, basic, and includes an excellent bibliography. It is recommended that it be read by every physician, whatever his specialty.—*Commander L. S. Madlem, Jr., MC, U. S. N.*

BOOK REVIEWS

Amenorrhea, by *Lawrence M. Randall,* M. D., Section on Obstetrics and Gynecology, Mayo Clinic, and *Thomas W. McElin,* M. D., Fellow in Obstetrics and Gynecology, Mayo Foundation, Rochester, Minn. Publication Number 109, American Lecture Series. A Monograph in American Lectures in Endocrinology. Edited by *Willard O. Thomson,* M. D., Clinical Professor of Medicine, University of Illinois College of Medicine; Managing Editor, Journal of Clinical Endocrinology, Chicago, Ill. 74 pages. Charles C Thomas Publisher, Springfield, Ill., 1951. Price $2.25.

This monograph is divided into 4 chapters, the first 3 of which have to do with signs, symptoms, and methods of study by various investigators. The fourth chapter is devoted to treatment. In reality, this monograph is an annotated bibliography of the literature on amenorrhea. The authors apparently believed that with such diversity of ideas concerning the causes and the methods of treatment of amenorrhea it was inadvisable to discuss their point of view in detail. In the light of the present shifting and uncertain state of our knowledge concerning the interrelationship of the endocrine glands, they wisely leave the choice of these divergent ideas up to the reader. This book should be in the hands of all who are interested enough to go to source material to improve their knowledge of menstrual disorders.

—*Commander R. E. Crowder, MC, U. S. N.*

The Neuroses, Diagnosis and Management of Functional Disorders and Minor Psychoses, by *Walter C. Alvarez,* M. D., Professor of Medicine, Emeritus, Mayo Foundation, University of Minnesota; Emeritus Consultant in Medicine, the Mayo Clinic. 667 pages. W. B. Saunders Co., Philadelphia, Pa., publisher, 1951. Price $10.

This excellent book was written for the use and guidance of the general practitioner as well as for specialists in the various fields of medicine. Doctor Alvarez, with his large experience as consultant, points out that a physician, regardless of his specialty, should treat the patient as a whole. He constantly emphasizes the importance of correlating the psychogenic factors in those that have organic illness. He presents the approach to and suggested treatment of the patient with functional disorders who has somatic complaints, and he describes the most modern concept of what any doctor may expect to encounter in the practice of medicine. He gives a clear description of the psychiatric manifestations of illness. The book has chapters devoted to all the major specialties. An excellent index provides ready reference to any particular symptom complex. This book is recommended for all physicians.—*Commander E. L. Hammond, MC, U. S. N.*

Cervical Spine Radiography[1]

Robert W. Augustine, *Lieutenant Colonel, U. S. A. F. (MC)*

Richard W. Eells, *First Lieutenant, U. S. A. F. (MC)*

IN ROENTGENOGRAPHIC delineation of the cervical spine the routine anteroposterior and lateral study is often inadequate for diagnosis. Clinically significant injuries and other abnormalities producing symptoms are often overlooked. Missed pedicle and articular facet fractures, in particular, may give rise to an unstable, painful neck or incapacitating neurologic complications. A technic has been devised which aids in demonstrating accurately the important components of the cervical vertebras. It may be applied to the acutely injured patient and requires no special equipment. Using one stereoscopic pair of films, it affords visualization which we believe superior to that obtained with any other view. Fractures not shown by conventional projections have been detected, permitting prompt and correct treatment.

The patient sits perfectly erect on a stool, facing in a direction at right angles to the x-ray tube, with the neck centered to a plain cassette holder. The jaw is raised to expose the upper cervical vertebras. By having the patient grasp the stool the shoulders are pulled downward to reveal the lower cervical vertebras. The head is then inclined a few degrees toward the tube, allowing the rays to pass at right angles through the intervertebral spaces. Without altering this positioning, the entire patient is rotated by revolving the stool about 8° towards the tube (fig. 1). Stereoscopic exposures are then made, using a horizontal tube-shift, 6-foot target-film distance, and routine technical factors. When only limited manipulation of the patient is permissable, essentially the same view can be made in the supine position.

The resulting films show the height and alinement of the centrums, the intervertebral spaces, the spinous processes, and soft tissue shadows as do ordinary lateral views (fig. 2). In addition, however, the pedicles, laminas, and articular facets are sufficiently separated that each structure on either side is distinctly seen. A difficult pedicle to visualize, that of the second cervical vertebra, is offset just enough to allow interpretation. Stereoscopic viewing gives invaluable perspective.

---

[1] United States Air Force Hospital, Maxwell Air Force Base, Ala.

Some practice is necessary, both in making and in reading this view. Results will be disappointing if the positioning is not exact. The rays must be properly centered to the midcervical spine and traverse it at right angles. If the patient is not rotated enough, overlapping of the two sides will thwart examination; if rotated too far, the alinement and disk spaces will not be accurately shown, and the neural arch and facet on one side will be lost behind the vertebral body. A fairly heavy exposure is necessary. In viewing, the illusion of depth may be enhanced by reversing the films.

Figure 1. Patient in proper position for x-raying cervical spine.

This technic is applied to all patients with chronic neck symptoms, and to those with acute conditions in whom the cervical spine is considered stable. In traumatic cases, a preliminary lateral scout film is made without moving the patient on the litter. If a dislocation or unstable fracture is demonstrated, or if there are neurologic signs, Crutchfield tongs are placed in the skull and straight cervical traction of 6 pounds is begun. Our examination is then made in the horizontal position.

For complete evaluation, the routine study is frequently supplemented by additional films. We have found 3 views to be of practical help in revealing defects not demonstrated on the ordinary examination.

1. *Anteroposterior open-mouth* view of the first and second cervical vertebras. This is made as soon as stability of the spine has been

Figure 2. Roentgenogram taken using recommended technic.

assured. The odontoid process and atlanto-axial articulations should not be neglected in any traumatic case.

2. *True lateral* view of the cervical spine in flexion and extension. This is taken in patients with old injury or neck complaints of some duration, as well as the acutely injured patient having neck complaints but no roentgenographic findings on other films. It allows detection of subluxations not shown in the erect position.

971621 O - 51 - 10

3. *Forty-five degree posterior oblique* views. These provide the best visualization of the neural foramina, and are made bilaterally when clinical or radiographic findings point to the possibility of nerve root involvement.

The usual anteroposterior view of the cervical spine has seldom been of value in traumatic cases. It is occasionally of assistance in rotary dislocations, in revealing defects of the transverse processes, and in patients with suspected spinal cord neoplasm.

SUMMARY

Routine anteroposterior and lateral radiographic study of the cervical spine is inadequate. Following injury, prompt and complete evaluation is essential if unsatisfactory results are to be avoided.

BOOK REVIEW

Prothrombin Deficiency, by *Rosemary Biggs,* M. D., Department of Pathology, Radcliffe Infirmary, Oxford. Publication Number 121, American Lecture Series, a monograph in American Lectures in Hematology. 83 pages. Charles C Thomas, Publisher, Springfield, Ill., 1951. Price $2.50.

This book begins with a complete review of the older theories of coagulation with a chronologic development of the more recent ones, which include "accelerator" and "factor V." The development of the theories is accompanied by a complete bibliography. Furthermore the author goes into detail on methods of performing and interpreting the one- and two-stage determinations of prothrombin time. He discusses the use of various thromboplastic preparations, including the use of Russell's viper venom with lecithin. The last part of the book deals with the application of one- or two-stage prothrombin technics to dicoumarin therapy and to clinical investigation of hypoprothrombinemia. The routine laboratory technics are placed in the appendix. The complexities of the reactions are adequately demonstrated and the author stresses that the currently used tests do not measure prothrombin as a quantitative chemical entity, but empirically measure the prothrombin effect. The book is concise, to the point, and summarizes the problems encountered in the diagnosis of prothrombin deficiency. It expounds on the uses and limitations of the tests now available. This volume should be a valuable reference for both the clinical pathologist and the internist.—*Lt. Col. A. S. Blaw, MC, U. S. A.*

Primary Split-Skin Graft in the Treatment of Pilonidal Cysts

Ellwood V. Boger, *Commander, MC, U. S. N. (1)*

Edward W. Pinkham, Jr., *Commander, MC, U. S. N. (1)*

PILONIDAL cyst or sinus has been known as an entity for more than 100 years. These embryonal vestigia have fomented much disagreement as to the most satisfactory surgical treatment. Inflammation of these cysts or sinuses is primarily a disease of young adults, and thus it becomes one of the more common surgical entities seen in service personnel. The treatment of the acutely inflamed cyst is not complicated, but the problem that is presented to medical officers in subsequent surgical handling has always been more difficult.

It is the policy in naval hospitals to retain active service personnel on the sick list until they are "fit to perform all the duties of their rate ashore or afloat," and it is the strict interpretation of this phrase that tends to encourage the long postoperative convalescence following block excision of a pilonidal cyst. Holman *(2)* has stated that in a 2-year period, 359,209 sick days were lost by naval personnel because of this disorder. Korb *(3)*, reporting U. S. Navy statistics for 1948, noted 84,682 days lost from duty because of this malady. This study, therefore, was undertaken to determine whether the application of a split-skin graft at the time of excision would adequately treat the condition and shorten hospitalization. The use of a split-skin graft was decided on because it seemed to be a procedure as simple as that of block excision and would not appreciably increase the operating time nor the demands on the skill of the surgeon.

The first step in the operative procedure consists of passing a groove director into the sinus tract and incising the skin over it. This exposes

(1) U. S. Naval Hospital, Philadelphia, Pa.

(2) Holman, E.: Pilonidal sinus—treatment by primary closure. Surg., Gynec. & Obst. 83: 94-100, July 1946. Quoted by Cortes, G. H., in Ciba Symposia, February 1950.

(3) Korb, J. H.: Infected pilonidal cysts; simplified method of treatment. Mil. Surgeon 108: 29-34, Jan. 1951.

the cavity of the sinus so that it may be probed for extensions. After complete delineation of the diseased tissue, the tract and skin edges are seized with Allis' forceps and, by sharp dissection through uninvolved tissue, the specimen is excised down to the presacral fascia. When hemostasis has been achieved, a split-skin graft of sufficient size to cover the defect caused by the excision is obtained from the adjacent gluteal region and placed over the defect. A vaseline-gauze layer is applied over the graft and pressure exerted by a mechanical waste dressing. For the first 2 postoperative days, the patient is allowed only a liquid diet and the prone position is maintained for 5 postoperative days. Careful observance of these two factors obtained the most adequate immobilization of the wound area, and this factor seemed responsible for the highest percentage of graft "take." On the fifth postoperative day the dressing is changed. The patient is given sitz baths three times a day to remove the usual skin detritus. These baths are continued until the wound is clean and dry. The length of time that the baths were required varied directly with the percentage of graft take.

RESULTS

The records of 38 patients on active duty recently operated on here for pilonidal cyst have been reviewed as a control group. The group was treated by block excision alone. These records were examined for age incidence, size of the specimen, method of healing, and the average duration of postoperative hospitalization. Our grafted group consisted of 25 similar patients. Only in the duration of hospitalization was any appreciable difference noted. The average postoperative hospital stay in the control series was 56.6 days (range 15 to 152). In the grafted group, the average postoperative hospital stay was 28.2 days (range 15 to 106). The patient in the grafted group who had been hospitalized the longest required the removal of a second pilonidal cyst about 20 days after the first had been removed and grafted. On the second occasion, a split-thickness skin graft was not applied. The patient in the control series with the longest hospitalization was one who had a large defect following block excision which healed slowly. A secondary split-skin graft would probably have shortened his period of hospitalization.

DISCUSSION

This preliminary series of 25 cases has demonstrated a simple satisfactory method for treating pilonidal cyst by excision and grafting which shortens the hospital stay of active duty personnel. These results compare favorably with those reported for the Lahey technic, suture and drainage, suture and packing, simple suture and excision and packing *(4)*. The results analyzed by Kooistra *(5)* in a series of pa-

(4) Breidenbach, L., and Wilson, H. L.: Pilonidal cysts and sinuses. Ann. Surg. 102: 455-463, Sept. 1935.

(5) Kooistra, H. P.: Pilonidal sinuses; review of literature and report of 350 cases. Am. J. Surg. 55: 3-17, Jan. 1942.

tients treated by excision and packing, excision with partial closure, excision and closure with later open packing, excision with primary closure, and excision with primary closure and drainage do not appear to fit the requirements of "fit for all duties of their rate afloat and ashore," because each patient required dressings for at least 26 days after hospitalization. The reports of Brezin *(6, 7)* deal with a variation of the sliding-flap technic by which the pilonidal cyst is excised by sharp dissection from under a full-thickness flap which is then resutured over the defect. The average hospital stay for patients so treated was 13.3 days to which a 14-day furlough was added. This series is particularly comparable to ours because the patients were also active service personnel. The average ineffective period among these patients thus becomes 27.3 days. Ferguson and Mecray *(8)* described a method of excision by sharp dissection with primary closure using through-and-through wire sutures to include the presacral fascia to hold a gauze pack in place over the wound. In 37 of their patients the average time required for healing was 17.4 days. The average time lost from work was 2 days. The technic requires greater skill on the part of the surgeon and a moderate increase in the operating time over that used by us. It cannot be denied, however, that the healing time reported in this series may offset the criticism offered. Kleiman *(9)* reported a series of over 500 patients with pilonidal cyst who were treated by block excision with closure by a technic similar to that described by Ferguson and Mecray. His results compare favorably with those of Ferguson and Mecray, but the technic is open to the same objection mentioned in connection with Ferguson's. Korb *(3)* reported a different technic; 22 patients were treated in a dispensary by delineation and incision of all tracts which were then packed with solid silver nitrate for 30 minutes. The resultant necrotic mass was then removed and a vaseline-gauze dressing applied. Hospitalization was recommended for those with much discomfort or those who desired it. The average hospital stay in this series was 0.72 days. Healing time was 25.4 days. These patients were not, however, able to perform all the duties of their rate" until complete healing was obtained and required daily treatment.

Our experience suggests that exact skin coverage of the postexcisional defect is essential for rapid healing, convalescence, and return to duty. We have used the freehand knife and Brown electrodermatome in our series. The use of the Brown electrodermatome in our hands has proved to be eminently satisfactory from the standpoints of uniformity of the grafts and ease of operation. We wish to point out, how-

(6) Brezin, D.: Pilonidal cyst; review of new procedure for operation and treatment. Am. J. Surg. 59: 18-24, Jan. 1943.

(7) Brezin, D.; Love, C.; and Lawrence, J.: Pilonidal cyst. Am. J. Surg. 60: 264-266, May 1943.

(8) Ferguson, L. K., and Mecray, P. M., Jr.: Pilonidal cysts; excision and primary suture in ambulatory patients. Am. J. Surg. 36: 270-278, Apr. 1937.

(9) Kleiman, A.: Pilonidal cyst; a comparison of surgical treatments. Surgery 28: 851-856, Nov. 1950.

ever, that the freehand knife is more generally available and also easy to use so that possession of the electrodermatome is not essential to the use of this technic. Furthermore, the use of skin grafts alleviated postoperative distress noted in the earlier series, again in direct proportion to the percentage of take. None of the cysts we treated were acutely inflamed at the time of operation, but on several occasions frank pus was encountered within the sinus or cyst. These patients recovered without incident or delay in healing.

CONCLUSIONS

In a preliminary study, primary split-skin grafting of the wounds following block excision of a pilonidal cyst or sinus reduced the hospital stay of active service personnel by 50 percent. The technic is simple and does not require an appreciable increase in the operating time or skill of the surgeon. It is anticipated that minor variations in technic will be developed which will decrease the hospital stay of such patients still further. No attempt is made at this time to evaluate this procedure from the standpoint of recurrence.

BOOK REVIEW

The Early Diagnosis of the Acute Abdomen, by *Zachary Cope,* B. A., M. D., M. S. Lond., F. R. C. S. Eng., Consulting Surgeon to St. Mary's Hospital, Paddington, and to the Bolingbroke Hospital, Wandsworth Common; late Hunterian Professor, Arris and Gale and Bradshaw Lecturer, Royal College of Surgeons, 10th edition. 270 pages; illustrated. Oxford University Press, New York, N. Y., publisher, 1951. Price $3.50.

This new edition is changed only slightly from the preceding edition which was printed in 1945. The first 3 chapters are devoted to the principles of diagnosis, history taking, and physical examination. The next 15 chapters take up the usual diseases encountered in the abdomen with much space devoted to differential diagnosis. These include obstetric, gynecologic, and urologic diseases, as well as those considered to be general surgical problems. One chapter deals with diseases encountered in the tropics and the last chapter is devoted to those conditions which may simulate abdominal emergencies. The subject matter is interesting as well as easily understood. This treatise maintains its place in medical literature as an invaluable aid to the student of medicine and it serves as a ready reference with which to refresh the practicing physician's memory. This or a similar presentation should be present in every medical library. The index is ample. There is no bibliography.—*Col. W. W. Nichols, MC, U. S. A.*

A Versatile Spinal Retractor

Joseph W. Batch, *Colonel, MC, U. S. A.*

OPERATIONS on the back require adequate retraction. Because of the variability in the depth of the musculature of backs in different patients and the variety of procedures which may be performed, it is highly desirable that a retractor be available which will provide adequate retraction. Because most retractors available to me did not possess the desired features, I thought it advisable to construct a retractor which could be used for almost any type of operative procedure and in most backs from those that are very thin to those that are thick and muscular.

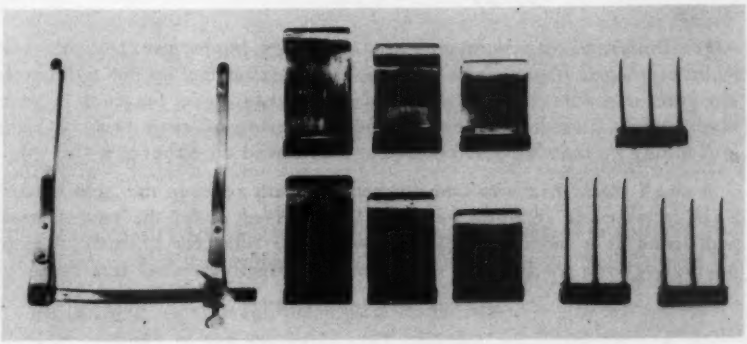


Figure 1 Spinal retractor showing frame, three pairs of blade plates, and three pronged blades.

A stainless steel retractor which consists of a basic frame with one rigid arm and a movable arm on a traversing rod was made. The free arm is moved by a pinion gear with a winged thumb handle. The position of this arm is fixed by a winged screw on the geared traversing rod (fig. 1). Three pairs of plain blades were made in graduated sizes for various thicknesses of the back. These blades slide one over each arm and lock in place by means of a pin in a spring clip on top of each arm, the pin passing into a hole drilled on top of each blade. The blades may be used as a pair for retraction on both sides of the spinous processes (fig. 2).

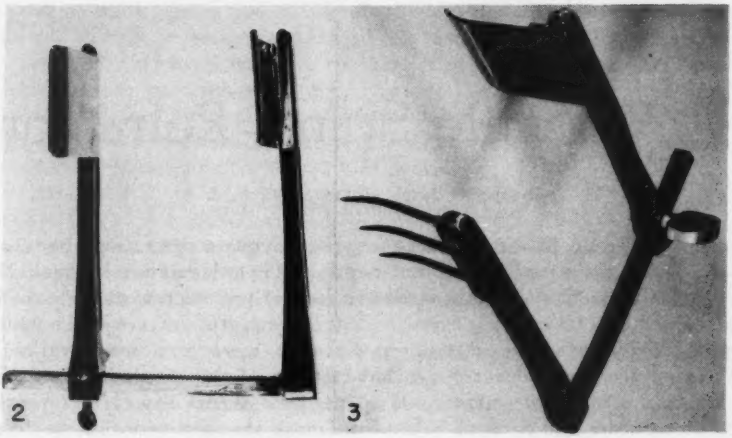


Figure 2. Spinal retractor showing undersurface with one pair of blades attached. Figure 3. Spinal retractor showing pronged and blade plates attached.

For unilateral exposure and retraction one blade may be used with a three-pronged blade which pierces the musculature on the side opposite the exposure. A three-pronged blade was made for each size of blade plate. Two holes were drilled in the top of each pronged blade for locking so that it could be reversed and used on either arm (fig. 3).

A small metal box was constructed in which to keep the nine blades. This retractor is reported because I have used it for the past 2 years and found it a most valuable and versatile retractor in back surgery, having features not found in the generally available spinal retractors.

Instrumental Perforation of Uterus[1]

John T. Parente, *Lieutenant, junior grade, MC, U. S. N. R.*
Albert L. May, *Lieutenant Commander, MC, U. S. N.*
A. Galvez, *M. D.*

UTERINE perforation by instrumentation of a pregnant uterus has been regarded by many authors as the most serious accident relating to the procedure of abortion. A careful, positive diagnosis of such a condition is imperative. When a positive diagnosis is made, laparotomy is indicated to determine the extent of the damage and correct it. The surgical correction depends essentially on the findings with proper consideration of the total socio-biologic status of the patient. The following case report represents an accident resulting from an abortion. The uterine perforation was complicated by herniation of the omentum through the tear. A remarkable feature was the lack of any signs, symptoms, or discomfort resulting from and following the accident.

CASE REPORT

On 8 April 1951 a 28-year-old Filipina, mother of 4 children had a dilatation and curettage performed on herself to abort her fifth pregnancy. The procedure was performed by a local physician in his office. The patient was given "something in her arm" for anesthesia, and recalls nothing of the operation. She received an injection of penicillin postoperatively and was discharged the following day with advice to go to a hospital for examination but she felt so well that she remained at home carrying out her usual household routine for 3 days prior to visiting the local hospital. She came to the hospital on 12 April only at the insistence of her husband, who was concerned over the note, given her by the abortionist, which stated that he had performed a dilatation and curettage and that he might have perforated the uterus.

The patient stated that her last menstrual period started on 7 January and was normal. She had had 4 full term spontaneous deliveries, all at home with the aid of a midwife. The last delivery occurred on 5 De-

(1) U. S. Naval Reservation Hospital, Subic Bay, Luzon, P. I.

cember 1950. On physical examination she was afebrile. There was slight tenderness over the suprapubic area to deep palpation. Pelvic examination revealed a small amount of bright red blood oozing from the cervical os. Some tissue protruded from the cervical os which was soft and the os admitted 1 fingertip. The uterus and adnexa could not be well defined.

The red blood cell count was 4.3 million with 12.5 gm. of hemoglobin. The leukocyte count was 11,250 with 78 percent polymorphonuclear cells, 19 percent lymphocytes, and 3 percent monocytes.

Figure 1. Uterine fundus showing omental tissue herniating through perforation.

On 13 April some of the tissue protruding from the cervix was obtained for examination. The hysterometer reading at this time was 4½ inches. Microscopic examination of tissue revealed omental tissue and infected placental and decidual tissue. On 27 April a laparotomy was performed. A portion of omentum was found to be adherent to the uterine fundus with herniation through a defect measuring 2.5 by 2 cm. The adhesions were released, the herniated omentum was ligated and separated, and a supracervical hysterectomy was performed (fig. 1). The patient made an uneventful recovery and was discharged on the eighth postoperative day.

Unusual Corneal Foreign Body

William R. True, *Lieutenant, MC, U. S. N.* (1)

ON 19 June 1951 a 22-year-old man was awakened by sharp, stabbing pains in the left eye, whereupon he discovered a 5-inch long scorpion lying across the eye and temporal area. The arachnid was brushed off and destroyed. The patient's eye became red immediately and throbbed with continuous pain. The eyelids swelled progressively and vision became slightly blurred within 1 hour; lacrimation and photophobia were marked. Emergency treatment consisted of 50 mg. of diphenhydramine hydrochloride, given orally q.i.d., warm compresses applied every 2 hours, and the instillation of penicillin ophthalmic ointment in the conjunctival sac. Examination of the left eye by an ophthalmologist on 22 June showed the vision to be decreased to a finger count at a distance of 3 feet, ciliary injection, punctate keratitis, and iritis. The patient's condition was good except for pain in the eye and drowsiness which was probably induced by the diphenhydramine. He was evacuated to this ship on 23 June for biomicroscopic studies and for further treatment.

The findings on admission were as follows: vision in each eye was 20/80 corrected with glasses to 20/20 OD and 20/40 OS. A pinhole disk did not further improve the vision of the left eye. Mydriasis of the left eye was present. The lids were red and edematous. The bulbar and palpebral portions of the conjunctiva were moderately injected. Slit-lamp microscopy revealed mild edema of the entire cornea. A needlelike shaft about 3 mm. long was embedded horizontally deep in the substantia propria of the cornea. A slight reaction was noted about this shaft. There was no staining with fluorescein. Several minute punctate lesions were seen on the epithelial surface of the cornea. There was a slight flare in the anterior chamber but no cells were noted. The iris, vitreous, and fundus were normal. The foreign body was invisible to the naked eye.

(1) U. S. S. *Haven*.

Under 0.5 percent pontocaine topical anesthesia the foreign body was extracted using a small Graefe knife and forceps with the aid of slit-lamp visualization. Because of its friability it was removed in 4 separate pieces. The base was cleaned with a small dental burr. The eye was dressed with an ointment containing 0.1 percent aureomycin and 1 percent atropine. Cortisone solution, (1:4 dilution), was used topically, 1 drop being instilled into the eye every 2 hours. The antihistaminics were continued. The cornea was completely healed without scarring and the iritis had resolved within 6 days. Microscopic examination of the foreign body revealed a minute, tapering, thin shaft without segmentation. This was assumed to be the tail-tip of the scorpion.

BOOK REVIEW

Clinical and Roentgenologic Evaluation of the Pelvis in Obstetrics, by *Howard C. Moloy,* M. D., M. Sc., Assistant Clinical Professor of Obstetrics and Gynecology, College of Physicians and Surgeons, Columbia University, and The Sloane Hospital for Women. 119 pages; illustrated. American Monograph Series. W. B. Saunders Co., Philadelphia, Pa., publishers, 1951.

This is a brief, well-written, practical monograph with excellent illustrations. The progress of pelvimetry and the problems encountered are discussed. Types of pelvis are completely described and classified. The clinical evaluation of pelves is discussed in an understandable, practical manner. The relation of forceps mechanisms to position and pelvic types is clearly summarized. The author's precision stereoscopic technic is described in detail. Throughout the book there are many practical bits of information and statements of generally accepted obstetrical procedures. This monograph, which includes a bibliography, is an attempt by the publisher to present various specialty subjects to the profession inexpensively. It is recommended to the student and the physician interested in obstetrics.

—*Col. H. E. Harrison, MC, U. S. A.*

BOOKS RECEIVED

The Public Health Nurse and Her Patient, by *Ruth Gilbert*, Coordinator, Course for Mental Hygiene Consultants and Assistant Professor of Nursing Education, Teachers College, Columbia University. 348 pages. Published for the Commonwealth Fund by Harvard University Press, Cambridge, Mass., 1951. Price $3.75.

Clinical Urography, An Atlas and Textbook of Roentgenologic Diagnosis, by *William F. Braasch*, M. D., Emeritus Consultant in Urology, Mayo Clinic, Emeritus Professor of Urology, Mayo Foundation, Graduate School, University of Minnesota, and *John L. Emmett*, M. D., Consultant in Urology, Mayo Clinic, Associate Professor of Urology, Mayo Foundation, Graduate School, University of Minnesota. 736 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1951.

Clinical and Roentgenologic Evaluation of the Pelvis in Obstetrics, by *Howard C. Moloy*, M. D., M. Sc., Assistant Clinical Professor of Obstetrics and Gynecology, College of Physicians and Surgeons, Columbia University, and the Sloane Hospital for Women. 119 pages; illustrated. American Monograph Series. W. B. Saunders Co., Philadelphia, Pa., publishers, 1951.

Decompression Sickness, Caisson Sickness, Diver's and Flier's Bends and Related Syndromes, compiled under the auspices of the *Subcommittee on Decompression Sickness, Committee on Aviation Medicine, Division of Medical Sciences, National Research Council*, Washington, D. C. 21 contributors. 437 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publishers, 1951.

Simplified Nursing, by *Florence Dakin*, R. N., former Inspector of Schools of Nursing, State of New Jersey; and *Ella M. Thompson*, B. S., R. N., formerly President, National Association for Practical Nurse Education; Member, Job Analysis Committee, United States Office of Education; Chairman, Production Committee of the Curriculum Committee, United States Office of Education; formerly Consultant, North Atlantic Area, American Red Cross, Volunteer Nurses' Aide Program. 5th edition. 730 pages; 78 illustrations. J. B. Lippincott Co., Philadelphia, Pa., publisher, 1951.

Diabetes Control, by *Edward L. Bortz*, M. D., Chief of Medical Service B, The Lankenau Hospital; Associate Professor of Medicine, Graduate School of Medicine, University of Pennsylvania, Philadelphia; former President of the American Medical Association. 264 pages; illustrated. Lea & Febiger, Philadelphia, Pa., publisher, 1951. Price $3.50.

Grouping, Typing and Banking of Blood, by *Otakar Jaroslav Pollak*, M. D., Ph. D., F. C. A. P., Director, Blood Bank; Chief, Departments of Anatomical, Clinical and Experimental Pathology; Director, School for Medical Technologists, Quincy City Hospital, Quincy, Mass.; Consultant Pathologist, Jordan Hospital, Plymouth, Mass. 163 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1951. Price $5.75.

Obstetrical Practice, by *Alfred C. Beck*, M. D., Professor Emeritus of Obstetrics and Gynecology, State University of New York, College of Medicine at New York City; formerly Professor of Obstetrics and Gynecology, Long Island College of Medicine; formerly Obstetrician and Gynecologist-in-Chief, Long Island College Hospital; Consultant in Obstetrics and Gynecology, Long Island College Hospital and Norwegian Hospital, Brooklyn, N. Y., U. S. Naval Hospital, St. Albans, N. Y., Vassar Brothers Hospital and St. Francis Hospital, Poughkeepsie, N. Y. 5th edition. 1,073 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., publisher, 1951. Price $10.

The Architecture of Normal and Malformed Hearts, A Phylogenetic Theory of Their Development, by *Dr. Alexander Spitzer*, Late Professor of Anatomy, The University of Vienna, With a Summary and Analysis of the Theory, by *Maurice Lev*, B. S., M. D., Associate Professor of Pathology, University of Illinois Hospitals, Chicago, Ill., and *Aloysius Vass*, M. D. with a Foreword by *Otto Saphir*, M. D., Pathologist, Michael Reese Hospital, Clinical Professor of Pathology, University of Illinois College of Medicine, Chicago, Ill. 145 pages; illustrated. Charles C Thomas Publisher, Springfield, Ill., 1951.

Prothrombin Deficiency, by *Rosemary Biggs*, M. D., Department of Pathology, Radcliffe Infirmary, Oxford. Publication Number 121, American Lecture Series, a monograph in American Lectures in Hematology. 83 pages. Charles C Thomas Publisher, Springfield, Ill., 1951. Price $2.50.

Surgical Measures in Hypertension, by *Reginald H. Smithwick*, M. D., Professor of Surgery and Chairman of the Department of Surgery, Boston University, School of Medicine; Surgeon-in-Chief, Massachusetts Memorial Hospital, Boston, Mass. Publication Number 61, American Lecture Series, a monograph in American Lectures in Surgery. 95 pages; illustrated. Charles C Thomas Publisher, Springfield, Ill., 1951.

Surgery of the Stomach and Duodenum, by *Claude E. Welch*, M. D., Associate Visiting Surgeon, Massachusetts General Hospital; Clinical Associate in Surgery, Harvard Medical School. 349 pages; illustrated by *Muriel McLatchie Miller*. The Year Book Publishers, Inc., Chicago, Ill., publisher, 1951. Price $8.50.

A Textbook of Clinical Neurology, by *J. M. Nielsen*, B. S., M. D., F. A. C. P., Clinical Professor of Neurology and Psychiatry, University of Southern California; Senior Attending Physician (Neurology), Los Angeles General Hospital; Attending Neurologist, Hospital of the Good Samaritan and Methodist Hospital, Los Angeles, Calif. 3d edition, revised and reset. 709 pages; 212 illustrations. Paul B. Hoeber, Inc., New York, N. Y., publishers, 1951. Price $10.

Dible and Davie's Pathology, An Introduction to Medicine and Surgery, by *J. Henry Dible*, M. B. (Glas.), F. R. C. P. (Lond.), Professor of Pathology in the University of London (Post-Graduate Medical School of London); Late Professor of Pathology at the London School of Medicine for Women; Professor of Pathology in the Welsh National School of Medicine; and Professor of Pathology in the University of Liverpool. 3d edition. 963 pages; 417 illustrations including 9 plates in colour. J. B. Lippincott Co., Philadelphia, Pa., publishers, 1950.

Food and You, by *Edmund Sigurd Nasset*, A. B., M. S., Ph. D., Professor of Physiology, Department of Physiology and Vital Economics, School of Medicine and Dentistry, University of Rochester, Rochester, N. Y. 92 pages. Charles C Thomas, Publisher, Springfield, Ill., 1951. Price $3.

Syphilis, by *Richard S. Weiss,* M. D., Professor Emeritus of Clinical Dermatology, School of Medicine, Washington University; Dermatologist-in-Chief, The Barnard Free Skin and Cancer Hospital, St. Louis, and *Herbert L. Joseph,* M. D., Consultant in Dermatology and Syphilology, U. S. Air Force Base, Travis Air Force Base, Calif., Instructor, Department of Medicine, Division of Dermatology, Stanford University School of Medicine, San Francisco. 180 pages; illustrated. Thomas Nelson & Sons, New York, N. Y., publishers, 1951. Price $5.

The New Military and Naval Dictionary, Edited by *Frank Gaynor,* Editor, "Encyclopedia of Atomic Energy." 295 pages. Philosophical Library, New York, N. Y., publishers, 1951. Price $6.

Global Epidemiology, A Geography of Disease and Sanitation, by *James Stevens Simmons,* B. S., M. D., Ph. D., Dr. P. H., Sc. D. (Hon.), Brigadier General, United States Army, Retired; Dean and Professor of Public Health, Harvard University School of Public Health; *Tom F. Whayne,* A. B., M. D., M. P. H., Dr. P. H., Colonel, M. C., United States Army; Chief, Preventive Medicine Division, Office of the Surgeon General, United States Army; *Gaylord W. Anderson,* A. B., M. D., Dr. P. H., Mayo Professor and Director, School of Public Health, University of Minnesota; *Harold Maclachlan Horack,* B. S., M. D., Member of Staff, Department of Medicine and Section of Cardiology, Ochsner Clinic, New Orleans; Instructor in Medicine, Tulane University School of Medicine; Associate Author, *Ruth Alida Thomas,* A. B., M. A., M. P. H., Research Associate, School of Public Health, University of Minnesota; Instructor, Department of Tropical Public Health, Harvard University School of Public Health, and Collaborators. Volume II, Africa and the Adjacent Islands. 652 pages. J. B. Lippincott Co., Philadelphia, Pa., publishers, 1951.

The 1951 Year Book of Medicine (May 1950-May 1951), edited by *Paul B. Beeson,* M. D., *J. Burns Amberson,* M. D.; *William B. Castle,* M. D., S. M. (Hon.) Yale, M. D., (Hon.) Utrecht; *Tinsley R. Harrison,* M. D.; and *George B. Eusterman,* M. D. 696 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1951. Price $5.

Bacterial and Virus Diseases: Antisera, Toxoids, Vaccines, and Tuberculins in Prophylaxis and Treatment, by *H. J. Parish,* M. D., F. R. C. P. E., D. P. H., Clinical Research Director, Wellcome Foundation Ltd.; formerly Bacteriologist, Wellcome Research Laboratories. 2d edition. 204 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., publishers, 1951. Price $2.50.

Ophthalmology, by *Arno E. Town,* M. D., Professor of Ophthalmology. The Jefferson Medical College of Philadelphia. 511 pages; 208 illustrations, 4 colored plates. Lea & Febiger, Philadelphia, Pa., publishers, 1951. Price $10.

Renal Pelvis and Ureter, by *Peter A. Narath,* M. D., F. I. C. S., Adjunct Professor of Urology, New York Polyclinic Medical School and Hospital. 429 pages; illustrated. Grune & Stratton, New York, N. Y., publishers, 1951. Price $12.50.

The Essentials of Modern Surgery, edited by *R. M. Handfield-Jones,* M. C., M. S., F. R. C. S., Senior Surgeon to St. Mary's Hospital; Lecturer in Surgery, St. Mary's Hospital Medical School; Member of the Court of Examiners, R. C. S., and Examiner in Surgery to the University of London; Late Hunterian Professor, R. C. S.; and *Sir Arthur E. Porritt,* K. C. M. G., C. B. E., M. A., M. Ch., F. R. C. S., a Surgeon to His Majesty the King; Surgeon, St. Mary's Hospital and Royal Masonic Hospital; Consulting Surgeon, Acton, North Herts and (L. C. C.) Hos-

pitals; Examiner in Surgery, University of Cambridge. 4th edition. 1,263 pages; 644 illustrations. The Williams & Wilkins Co., Baltimore, Md., publishers, 1951. Price $11.

The Application of Scientific Methods to Industrial and Service Medicine (Proceedings of a Conference held from March 29 to March 31, 1951), *Privy Council, Medical Research Council.* 112 pages; illustrated. His Majesty's Stationery Office, London, England, publishers, 1951. Price 3 shillings (about 40 cents).

Poisons, Their Isolation and Identification, by *Frank Bamford,* B.Sc., Late Director of the Medico-Legal Laboratory, Cairo. Revised by *C. P. Stewart,* D.Sc., Ph.D., Reader in Clinical Chemistry, University of Edinburgh; Senior Biochemist, Royal Infirmary, Edinburgh, with a foreword by *Sir Sydney Smith,* C.B.E., F.R.C.P., Regius Professor of Forensic Medicine, University of Edinburgh. 3d edition. 316 pages; 23 illustrations. The Blakiston Co., Philadelphia, Pa., publishers, 1951. Price $5.50.

Textbook of Organic Chemistry, by *Carl R. Noller,* Professor of Chemistry, Stanford University. 643 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publishers, 1951.

A Textbook of Medical Conditions for Physiotherapists, by *Joan E. Cash,* B.A., M.C.S.P., (Teachers' Certificates), with a foreword by *Frank D. Howitt,* C.V.O., M.A., M.D., F.R.C.P. 350 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., publishers, 1951.

Atlas of Cross Section Anatomy of the Brain, Guide to the Study of the Morphology and Fiber Tracts of the Human Brain. Fifth Section of *Emil Villiger's* Brain and Spinal Cord, 14th edition. Revised by *Eugen Ludwig,* Professor of Anatomy, University of Basel; Atlas further revised by *A. T. Rasmussen,* Professor of Anatomy, University of Minnesota. 63 plates. The Blakiston Co., Philadelphia, Pa., publishers, 1951. Price $5.50.

Collected Papers of the Mayo Clinic and the Mayo Foundation, edited by *Richard M. Hewitt,* B.A., M.A., M.D.; *A. B. Nevling,* M.D.; *John R. Miner,* B.A., Sc.D.; *James R. Eckman,* A.B., M.A., Ph.D.; *M. Katharine Smith,* B.A.; *Carl M. Gambill,* A.B., M.D., M.P.H.; and *Florence Schmidt,* B.S.E. Vol. XLII, 1950. 812 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publishers, 1951

Review of Physiological Chemistry, by *Harold A. Harper,* Ph.D., Professor of Biology (Biochemistry), University of San Francisco; Lecturer in Surgery, University of California School of Medicine, San Francisco; Biochemist Consultant to Metabolic Research Facility, U. S. Naval Hospital, Oakland; Director, Biochemistry Laboratory, St. Mary's Hospital, San Francisco. 3d edition. 260 pages; illustrated. University Medical Publishers, Palo Alto, Calif., 1951. Price $3.50.

A Textbook of Pathology, Pathologic Anatomy in Relation to the Causes, Pathogenesis, and Clinical Manifestations of Disease, by *Robert Allan Moore,* Edward Mallinckrodt Professor of Pathology, Washington University School of Medicine, St. Louis, Mo. 2d edition. 1,048 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publishers, 1951.

Proceedings of the Second Clinical ACTH Conference, Volume I—Research, and Volume II—Therapeutics, edited by *John R. Mote,* M.D. Volume I, 531 pages; illustrated; Volume II, 716 pages; illustrated. The Blakiston Co., Philadelphia, Pa., publishers, 1951. Price each volume $8.50.

The Serviceman and the Law, by *Morris O. Edwards,* Colonel, Inf., and *Charles L. Decker,* Colonel, JAGC. 6th edition. 401 pages; illustrated. The Military Service Publishing Co., Harrisburg, Pa., 1951. Price $3.50.

Radiologic Physics, by *Charles Weyl* and *S. Reid Warren, Jr.,* Moore School of Electrical Engineering, University of Pennsylvania, with a foreword by *Eugene P. Pendergrass,* M.D., Director of the Department of Radiology, University of Pennsylvania. 2d edition. 491 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1951. Price $10

The Early Diagnosis of the Acute Abdomen, by *Zachary Cope,* B.A., M.D., M.S. Lond., F.R.C.S. Eng., Consulting Surgeon to St. Mary's Hospital, Paddington, and to the Bolingbroke Hospital, Wandsworth Common; late Hunterian Professor, Arris and Gals and Bradshaw Lecturer, Royal College of Surgeons. 10th edition. 270 pages; illustrated. Oxford University Press, New York, N.Y., publisher, 1951. Price $3.50.

The Quantitation of Mixtures of Hemoglobin Derivatives by Photoelectric Spectrophotometry, by *Francis T. Hunter,* A.M., M.D., Associate in Medicine, Harvard Medical School; Associate Physician and Clinical Pathologist, Massachusetts General Hospital, Boston, Mass. 226 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1951. Price $8.50.

New and Nonofficial Remedies, Containing Descriptions of the Articles which Stand Accepted by the Council on Pharmacy and Chemistry of the American Medical Association on January 1, 1951, issued under the Direction and Supervision of The Council on Pharmacy and Chemistry, American Medical Association. 782 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., publishers, 1951.

The Housefly, Its Natural History, Medical Importance, and Control, by *Luther S. West,* Professor and Head of Department of Biology, Northern Michigan College of Education; Major, Medical Service Corps, U.S.A.R. 584 pages; illustrated. Comstock Publishing Co., Ithaca, New York, publishers, 1951. Price $7.50.

The Management of Fractures, Dislocations, and Sprains, by *John Albert Key,* B.S., M.D., St. Louis, Mo., Clinical Professor of Orthopedic Surgery, Washington University School of Medicine; Associate Surgeon, Barnes, Children's, and Jewish Hospitals, and *H. Earle Conwell,* M.D., F.A.C.S., Birmingham, Ala., Associate Professor of Orthopaedic Surgery, University of Alabama School of Medicine; Chief of the Orthopaedic Service, South Highland Infirmary; Consulting Orthopaedic Surgeon to Carraway Methodist Hospital and Baptist Hospitals; Attending Orthopaedic Surgeon, Children's Hospital, Jefferson-Hillman Hospital, East End Memorial Hospital, and St. Vincent's Hospital, Birmingham, Ala. 5th edition. 1,232 pages; illustrated. The C. V. Mosby Co., St. Louis, Mo., publishers, 1951. Price $16.

An Atlas of Anatomy, by *J. C. Boileau Grant,* M.C., M.B., Ch.B., F.R.C.S. (Edin.), Professor of Anatomy in the University of Toronto. By Regions: Upper Limb, Abdomen, Perineum, Pelvis, Lower Limb, Vertebrae, Vertebral Column, Thorax, Head and Neck, Cranial Nerves and Dermatomes. 3d edition. 637 plates. The Williams & Wilkins Co., Baltimore, Md., publishers, 1951.

From a Doctor's Heart, by *Eugene F. Snyder,* M.D., with a foreword by *Paul Dudley White,* M.D. 251 pages; illustrated. Philosophical Library, New York, N.Y., publishers, 1951. Price $3.75.

971621 O - 51 - 11

Manual Therapy, by *James B. Mennell*, M.A., M.D., B.C., (Cantab.), Consulting Physician in Physical Medicine, St. Thomas's Hospital; Vice-President and Hon. Fellow, Chartered Society of Physiotherapy, London, England; Gold Key of the American Congress of Physical Medicine; Gold Key of the American Physical Therapy Association; Honorary Life Member of the Netherlands Physical Therapy Association. 64 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1951. Price $2.25.

Large Scale Rorschach Techniques, A Manual for the Group Rorschach and Multiple Choice Tests, by *M. R. Harrower*, Ph.D., Research and Consulting Psychologist, New York City, and *M. E. Steiner*, M.A., Research Psychologist, General Electric Company, Bridgeport, Conn., with Contributions by *Floyd O. Due*, M.D., Assistant Clinical Professor of Psychiatry, University of California Medical School, *Beatrice A. Wright*, Ph.D., Assistant Professor of Psychology, San Francisco State College, and M. Erik Wright, Ph.D., M.D., Professor of Clinical Psychology, Department of Psychiatry, University of Kansas Medical School, Department of Psychology, University of Kansas. 2d edition. 331 pages; 136 illustrations; 87 tables. Charles C Thomas, Publisher, Springfield, Ill., 1951. Price $8.50.

Metabolic Methods, Clinical Procedures in the Study of Metabolic Functions, by *C. Frank Consolazio*, Chief of Biochemistry, United States Army Medical Nutrition Laboratory, Chicago, Ill.; *Robert E. Johnson*, M.D., D. Phil. (Oxford), Professor and Head of the Department of Physiology, University of Illinois, Urbana, Ill.; and Evelyn Marek, M.A., Biochemist, United States Army Medical Nutrition Laboratory, Chicago, Ill. 471 pages; illustrated. The C. V. Mosby Co., St. Louis, Mo., publisher, 1951. Price $6.75.

Principles and Practice of Obstetrics, originally by *Joseph B. Delee*, M.D., by *J. P. Greenhill*, M.D., Attending Obstetrician and Gynecologist, The Michael Reese Hospital; Obstetrician and Gynecologist, Associate Staff, the Chicago Lying-in Hospital; Attending Gynecologist, Cook County Hospital; Professor of Gynecology, Cook County Graduate School of Medicine. 10th edition. 1,120 pages; 1,140 illustrations. W. B. Saunders Co., Philadelphia, Pa., publishers, 1951.

Clinical Pediatric Urology, by *Meridith Campbell*, M.S., M.D., F.A.C.S., Professor of Urology, New York University Post-Graduate Medical School; Visiting Urologist, Bellevue and University Hospitals, New York, with a Section on Nephritis and Allied Diseases in Infancy and Childhood, by *Elvira Goettsch*, A.B., M.D., Associate Professor of Pediatrics, University of Southern California School of Medicine, and Assistant Medical Director of The Children's Hospital Society of Los Angeles, and *John D. Lyttle*, A.B., M.D., Late Professor of Pediatrics, University of Southern California School of Medicine; and Medical Director of The Children's Hospital Society of Los Angeles. 1,113 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publishers, 1951.

Clinical Hematology, by *Maxwell M. Wintrobe*, M.D., Ph.D., Professor of Medicine and Director, Laboratory for the Study of Hereditary and Metabolic Disorders, University of Utah, College of Medicine, Salt Lake City, Utah; formerly Associate in Medicine, Johns Hopkins University, Associate Physician, Johns Hopkins Hospital, and Physician-in-charge, Clinic for Nutritional, Gastro-Intestinal and Hemopoietic Disorders, Baltimore, Md. 3d edition, thoroughly revised. 1,048 pages; 220 illustrations and 17 plates, 13 in color. Lea & Febiger, Philadelphia, Pa., publisher, 1951. Price $12.50.

Tobacco and the Cardiovascular System, the Effects of Smoking and of Nicotine on Normal Persons, by *Grace M. Roth,* Ph.D., Associate Professor of Experimental Medicine, Mayo Foundation for Medical Education and Research, Graduate School, University of Minnesota, and Consultant in Section on Physiology, Mayo Clinic, Rochester, Minn. Publication Number 100, American Lecture Series. A Monograph in American Lectures in Circulation. Edited by *Irvine H. Page,* M.D., Cleveland Clinic, Cleveland, Ohio, and *A. C. Corcoran,* M. D., Cleveland Clinic, Cleveland, Ohio. 66 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1951. Price $2.25.

Frontal Lobotomy and Affective Behavior, a Neurophysiological Analysis, by *John F. Fulton,* M.D., Sterling Professor of Physiology, Yale University, 159 pages; illustrated. W. W. Norton & Co., Inc., New York, N.Y., publisher, 1951. Price $3.

Progress in Neurology and Psychiatry, An Annual Review, Volume VI, edited by *E. A. Spiegal,* M.D., Professor and Head of the Department of Experimental Neurology, Temple University School of Medicine, Philadelphia, Pa. 562 pages. Grune & Stratton, New York, N. Y., publisher, 1951. Price $10.

Primary Anatomy, by *H. A. Cates,* M.B., Professor of Anatomy and Director of the School of Physical and Health Education, University of Toronto. 2d edition. 344 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., publisher, 1951.

Roentgen Anatomy (Roentgen Anatomia), by *David Steel,* M.D., St. John's Hospital, Evangelical Deaconess Hospital, Cleveland, Ohio. 108 full page plates. Charles C Thomas, Publisher, Springfield, Ill., 1951. Price $8.

Causalgia, by *Frank H. Mayfield,* M.D., Assistant Professor of Clinical Surgery, College of Medicine, University of Cincinnati; Attending Neurological Surgeon, Bethesda Hospital, Christ Hospital, Deaconess Hospital, Good Samaritan Hospital, St. Francis Hospital, and Jewish Hospital, Cincinnati, Ohio. Publication Number 58, American Lecture Series. A Monograph in American Lectures in Neurosurgery. Edited by *Michael E. De Bakey,* M.D., Professor of Surgery and Head of the Department of Surgery, Baylor University College of Medicine, Houston, Tex., and *R. Glan Spurling,* M.D., Clinical Professor of Surgery, University of Louisville, Louisville, Ky. Neurosurgical Division edited by *Barnes Woodhall,* M.D., Professor of Neurosurgery, Duke Hospital and School of Medicine, Durham, N.C. 65 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1951. Price $2.25.

Amenorrhea, by *Lawrence M. Randall,* M.D., Section on Obstetrics and Gynecology, Mayo Clinic, and *Thomas W. McElin,* M.D., Fellow in Obstetrics and Gynecology, Mayo Foundation, Rochester, Minn. Publication Number 109, American Lecture Series. A Monograph in American Lectures in Endocrinology. Edited by *Willard O. Thomson,* M.D., Clinical Professor of Medicine, University of Illinois College of Medicine; Managing Editor, Journal of Clinical Endocrinology, Chicago, Ill. 74 pages. Charles C Thomas, Publisher, Springfield, Ill., 1951. Price $2.25.

Cunningham's Text-Book of Anatomy, edited by *James Couper Brash,* M.C., M.A., M.D., D.Sc., F.R.C.S.Ed., F.R.S.E., Professor of Anatomy, University of Edinburgh. 9th edition. 1,604 pages; illustrated by 1,252 text figures, 699 of which are printed in colours, and 88 plates including 145 radiographs. Oxford University Press, New York, N.Y., publisher, 1951. Price $14.

Proceedings of the Third International Congress of the International Society of Hematology, Cambridge, England - August 21-25, 1950. Editorial Committee: *Carl V. Moore*, U.S.A., Editor-in-Chief; *L. Berman*, U.S.A.; *J. Bernard*, France; *S. Haberman*, U.S.A.; *J. Hill*, U.S.A.; *H. Ludin*, Switzerland; *R. MacFarland*, U.K.; *S. Mettier*, U.S.A.; *R. Race*, U.K.; and *E. Storti*, Italy. 593 pages; illustrated. Grune & Stratton, New York, N.Y., publisher, 1951. Price: Cloth bound $10; Paper bound $8.

Chronology of Ophthalmic Development, An Outline Summary of the Anatomical and Functional Development of the Visual Mechanism Before and After Birth, by *Arthur H. Keeney*, M.D., Wills Eye Hospital, Philadelphia, Pa. Publication Number 99, American Lecture Series, A Monograph in American Lectures in Surgery. 22 pages. Charles C Thomas, Publisher, Springfield, Ill., 1951. Price $2.

The Effect of Hormones Upon the Testis and Accessory Sex Organs, by *Norris J. Heckel*, A.B., M.D., Clinical Professor of Urology, Department of Surgery, University of Illinois College of Medicine; Chairman, Department of Urology, Presbyterian Hospital; Attending Urologist, Ravenswood Hospital and Henrotin Hospital; Consulting Urologist, Chicago Intensive Treatment Center, Chicago, Ill. Publication No. 110, American Lecture Series, A Monograph in American Lectures in Endocrinology. 73 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill. 1951. Price $2.25.

A Color Atlas of Morphologic Hematology, with a Guide to Clinical Interpretation, by *Geneva A. Daland*, B.S., Chief Laboratory Assistant In Hematalogy, Thorndike Memorial Laboratory; Research Laboratory Technician, Boston City Hospital. Edited by *Thomas Hale Ham*, M.D., Assistant Professor of Medicine, Harvard Medical School; Associate Director, Thorndike Memorial Laboratory; Junior Visiting Physician, Boston City Hospital. 74 pages; illustrations by *Etta Piotti*. From the Second and Fourth (Harvard) Medical Services and the Thorndike Memorial Laboratory, Boston City Hospital. Harvard University Press, Cambridge, Mass., publishers, 1951. Price $5.

Inhalation Anesthesia, A Fundamental Guide, by *Arthur E. Guedel*, M.D., Associate Clinical Professor of Surgery (Emeritus), University of Southern California School of Medicine. 2d edition. 143 pages. The Macmillan Co., New York, N.Y., publisher, 1951. Price $3.75.

Children's Radiographic Technic, by *Forrest E. Shurtleff*, R.T., The Children's Medical Center, Boston, Mass. 80 pages; illustrated. Lea & Febiger, Philadelphia, Pa., publisher, 1951. Price $3.75.

BOOK REVIEWS

Progress in Neurology and Psychiatry, An Annual Review, Volume VI, edited by *E. A. Spiegal,* M. D., Professor and Head of the Department of Experimental Neurology, Temple University School of Medicine, Philadelphia, Pa. 562 pages. Grune & Stratton, New York, N. Y., publisher, 1951. Price $10.

This volume is replete with information concerning the newest developments in the field of psychiatry and neurology which may be of interest not only to general practitioners but also to specialists and research workers. In it the current literature is reviewed. About one-third of the book is devoted to clinical neurology; about one-third to clinical psychiatry; about one-sixth to basic sciences; and about one-sixth to neurosurgery. As the author states: "It is hoped that in this way a proper balance corresponding to the actual need of the reader and the amount of published material has been reached, particularly since the importance of basic studies in clinical medicine is more and more coming to be recognized and a healthy trend can be noted among progressive psychiatrists trying to liberate this discipline from its isolation and to integrate it into the whole field of medicine." Seventy-two contributors, each experts in their respective fields, have collaborated in achieving the purpose of the series: to develop an up-to-date encyclopedia of neurology and psychiatry. Problems currently debated in the neuropsychiatric literature are adequately, if briefly, treated. The extensive references at the end of each chapter allow the reader to pursue much more completely the literature dealing with any particular problem. Because no practitioner has the time or background to review or appraise the significant contributions in all branches of neurology and psychiatry, this book should be required reading.

—*Lt. Col. A. L. Brown, MC, U. S. A.*

Surgical Pathology of the Mouth, by *E. Wilfred Fish,* C. B. E., M. D., Ch. B., L. D. S., (Manch.), D. D. Sc. (Melb.), D. Sc. (Lond.), F. D. S., R. C. S. (Eng.) (From the Meyerstein Laboratory for Dental Research, St. Mary's Hospital, Paddington, London), Dental Surgeon, St. Mary's Hospital, London; Late Dental Surgeon, Royal Dental Hospital, London; Hon. Research Associate in Physiology, University College, London; External Examiner in Oral Anatomy and Physiology, University of Durham; Late Examiner in Dental Surgery and Pathology, University of Manchester. 463 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., publisher, 1951. Price $10.

In his preface the author states that he does not intend his book to take the place of a text of general pathology, nor the more extensive

texts of oral pathology. The real purpose of this excellent work is best stated in the author's own words; "Neither is this a book to consult when some rare manifestation of oral disease turns up; but it does perhaps represent, however inadequately, the irreducible minimum of pathology which the dental student or practitioner will need to assimilate and remember if he is to understand his daily work and predict his results."

Dr. Fish succeeds admirably in his purpose. He has clearly documented the common conditions which affect the teeth and their supporting structures, and which daily confront the general practitioner. The early chapters deal with elementary physiology and pathology and their application to the dental structures. In the later chapters these factors are applied to the individual tissues, both dental and oral. In addition each chapter contains the accounts and results of numerous experiments on animals which the author or his colleagues have performed and from which the author has drawn many of his conclusions.

The book is profusely illustrated with clearly labeled photomicrographs, roentgenograms, and diagrams which supplement the printed text. This volume is recommended for the general practitioner as a refresher and to the student as a supplement to his more extensive texts. It is also recommended to the graduate student in oral pathology because many lines of experimental pathology are suggested.

—Lt. Col. J. P. Kane, U. S. A. F. (DC)

Clinical Urography, An Atlas and Textbook of Roentgenologic Diagnosis, by *William F. Braasch,* M. D., Emeritus Consultant in Urology, Mayo Clinic, Emeritus Professor of Urology, Mayo Foundation, Graduate School, University of Minnesota, and *John L. Emmett,* M. D., Consultant in Urology, Mayo Clinic, Associate Professor of Urology, Mayo Foundation, Graduate School, University of Minnesota. 736 pages; illustrated. The W. B. Saunders Co., Philadelphia, Pa., publishers, 1951.

This book is the most complete work of its kind that has been published since Dr. Braasch's "Urography" in 1927. There are 1,361 illustrations of 1,778 urograms selected from the vast storehouse of x-ray films at the Mayo Clinic. In no other institution at any time has there been so much material so thoroughly classified and presented in book form. The references at the end of each chapter are complete and selected in masterly manner. The excellent index makes the material accessible for study. The book can be used as a ready reference in the urologic conferences by utilizing the illustrations for comparison with the films under consideration. The book may be used as a text for reference by merely utilizing the illustrations or for more thorough study by consulting the printed text.

All of the 12 chapters are outstanding. In Chapter 3, every type of variation of the normal urogram is shown. A thorough study of this chapter will aid the urologist in interpreting variations of the normal

urogram so often described as pathologic. The urologist and roentgenologist are greatly indebted to the authors for the enormous amount of time and study that has been put into the preparation of this book.

—*Col. J. C. Kimbrough, MC, U. S. A.*

Somatic and Psychiatric Treatment of Asthma, edited by *Harold A. Abramson*, M.D., Associate Physician and Chief, Allergy Clinic, The Mount Sinai Hospital, New York; Assistant Professor of Physiology, The College of Physicians and Surgeons, Columbia University. 751 pages; illustrated. The Williams and Wilkins Co., Baltimore, Md., publishers, 1951. Price $11.

Doctor Abramson and his associates have compiled an excellent new text on allergy with special emphasis on the psychiatric phase usually not found in other such texts. It encompasses the most modern trends in somatic therapy. Cortisone and ACTH, psychotherapy in all of its angles, the antihistaminics, bronchoscopy, and the surgical management of asthma are especially well illustrated and described.

—*Lt. Col. A. J. Berger, MC, U. S. A.*

Metabolic Methods, Clinical Procedures in the Study of Metabolic Functions, by *C. Frank Consolazio*, Chief of Biochemistry, United States Army Medical Nutrition Laboratory, Chicago, Ill., *Robert E. Johnson*, M. D., D. Phil. (Oxford), Professor and Head of the Department of Physiology, University of Illinois, Urbana, Ill., and *Evelyn Marek*, M. A., Biochemist, United States Army Medical Nutrition Laboratory, Chicago, Ill. 471 pages; illustrated. The C. V. Mosby Co., St. Louis, Mo., publisher, 1951. Price $6.75.

This monograph places at the finger tips of the laboratory worker, physician or technician, a large amount of essential methodology, which otherwise could only be obtained by laborious search and perusal of many library reference volumes. Every optimum method for the determination of substances, from minerals to endocrines, in a metabolic laboratory has been included. Methods of choice, whether macroscopic or microscopic, are presented. Every aspect of mammalian metabolism has been covered including (1) spectrophotometry, (2) methods for the determination of carbohydrates and their derivatives, vitamins, hormones, and enzymes, (3) physiologic methods for blood gases and respiratory gases, (4) function tests for the liver and kidney, and (5) even methods for the determination of substances of occasional clinical importance such as heparin, nicotine, and procaine. (This names but a few of the procedures.) The arrangement of each method is ideal, for first the references are given; then, the method with a discussion of the principle involved and a description of the apparatus; next, the procedure is described; and finally the calculations and the precautions to be taken are presented. Examples of the mathematical calculations, and many time-saving line charts and graphs have been placed throughout the book. The omission of the sources where special pieces of apparatus may be purchased and procured is unfortunate.

This monograph fulfills a great need for the laboratory and research worker by placing in a readily available and crystal-clear form the methods employed in the study and determinations of the metabolism of mammals, whether they are experimental animals or the ill human patient. The availability of the material makes it a time saver. The form of presentation of the material makes the book an ideal manual for teaching and for study. The shelf of every clinical laboratory and research department should contain this book.

—*Commander H. A. Lyons, MC, U. S. N.*

Diseases of the Endocrine Glands, by *Louis J. Soffer*, M. D., F. A. C. P., Associate Attending Physician and Head of the Endocrine Research Laboratory and Clinic, The Mount Sinai Hospital, New York City; Assistant Clinical Professor of Medicine, Columbia University. 1,142 pages; 88 illustrations and 3 colored plates. Lea & Febiger, Philadelphia, Pa., publishers, 1951. Price $15.

The field of endocrinology has progressively developed and extended and Dr. Soffer has written this book to include these latest developments. He has taken a broad view of endocrinology because of the increased evidence that the endocrine glands play a fundamental role in all physiologic processes. His treatment of physiologic and clinical topics is thorough. The syndromes of diseases of the endocrine glands are clearly described. In spite of its general excellence there are a few deficiencies in the book. For example, in the discussion of pheochromocytomas there is no mention of norepinephrine except to state that recently it has been demonstrated to be present in these tumors, and again, no mention is made of the organic brain lesions that may result from hypoglycemia. The section on the adrenals is superb. It bears the mark of the author's previous excellent monograph on the adrenal glands. Dr. Soffer has wisely gotten the assistance of Dr. Dolger, who has written the section on diabetes mellitus, and of Dr. Sohval, who has prepared the section on the gonads. Both coauthors have done their tasks well. This book is recommended for both the student and the endocrinologist. —*Commander H. A. Lyons, MC, U. S. N.*

Anesthesia in General Practice, by *Stuart C. Cullen*, M. D., Head of Division of Anesthesiology, Department of Surgery, State University of Iowa Hospitals; Professor of Surgery (Anesthesiology), State University of Iowa College of Medicine. 3d edition. 292 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., publisher, 1951. Price $4.50.

This book has been revised and improved. It is a collection of the lectures he has given to the medical students at the university and emphasizes the thesis that anesthesia cannot and should not be taught by "cook book methods." In support of this the author does not give any minute, specific technical details but states only that these details exist and then goes on to show their relation and importance to the patient. Logical as this is, I believe that a little more detailed discussion on some of the more controversial points would strengthen

the work, especially for the part-time anesthetist. This is an excellent reference manual for students and especially the part-time anesthetist who needs occasional "brushing up" on some particular method or drug. The illustrative cartoons are excellent and complement the text for the student by emphasizing the point being discussed in a way that is pleasant and still forceful. The format of the book is good, and it is easily read.—*Maj. D. E. MacQuigg, MC, U. S. A.*

A Textbook of Pathology, Pathologic Anatomy in Relation to the Causes, Pathogenesis, and Clinical Manifestations of Disease, by *Robert Allan Moore,* Edward Mallinckrodt Professor of Pathology, Washington University School of Medicine, St. Louis, Mo. 2d edition. 1,048 pages; illustrated. The W. B. Saunders Co., Philadelphia, Pa., publishers, 1951.

The first edition of this text published in 1945 won rapid acceptance as a standard American work on pathologic anatomy. The publisher's decision to reset the type has provided the author with an opportunity for revision, of which he has taken full advantage. As indicated in the preface to this edition, the major changes include: addition of new chapters to round out the subject matter; subdivision of longer chapters; rearrangement of chapters to improve correlation or to conform to changing concepts; addition of sections on topics omitted from the first edition, including some whose importance has been augmented in the interim; relocation of sections because of new information; and revision of subject matter because of new or changing information. There are now chapters on diffuse collagen diseases, demyelinating encephalitides, and disturbances on enzyme metabolism, among others. The material on renal disease, formerly scattered, has been brought together. Several topics, including infectious hepatitis, have been grouped in the section on viral disease.

The book has become easier to handle in this edition. Increased page size has made possible a less bulky volume, and the adoption of the two-column format makes for easier reading. The binding is good; the typography is clear; and the frequent subheads are helpful in a reference work. Many of the illustrations are credited to the Armed Forces Institute of Pathology. Of the colored illustrations, the majority portray clinical subjects or gross lesions. Most are in color. There are a number of maps portraying the geographic distribution of infectious diseases. The references following each chapter are numerous, though not exhaustive.

That this work is oriented to the needs of the undergraduate medical student is apparent from the reprinted author's preface to the first edition. Less immediately obvious is its value to the medical officer seeking to familiarize himself with the structural changes underlying the more recently delineated entities, or to keep abreast of developments in this basic field. As the subtitle indicates, the object has been to relate morphologic pathology to the living patient, and in this the author would appear to have succeeded admirably. Of outstanding value

in this regard are the paragraphs on "clinicopathologic correlation" which are included in the sections on most of the diseases described. The pathologist will find the book valuable as a refresher, and as a ready source of reference to some of the more recent literature. It deals carefully and authoritatively with the major disease entities, and at appropriate length with others.—*Maj. J. B. Hartney, MC, U. S. A.*

The Bender-Gestalt Test, Quantification and Validity for Adults, by *Gerald R. Pascal,* Ph. D., Research Psychologist, Western Psychiatric Institute and Clinic; Associate Professor of Psychology, University of Pittsburgh, and *Barbara J. Suttell,* M. S., Associate Research Psychologist, Western Psychiatric Institute and Clinic. Foreword by *David G. Wright,* M. D. 274 pages; illustrated. Grune & Stratton, New York, N. Y., publisher, 1951. Price $6.50.

The Bender-Gestalt test consists of 9 simple designs, each of which is presented to a subject for him to copy on a piece of paper. This book presents a systematic method for quantitative scoring of the test, and the results obtained by applying the method to the test records of normal adults (nonpatients) and adults with psychogenic disorders. Part I is a report and discussion of the research studies made by the authors in their investigation of the reliability and validity of the scoring method and the establishment of standards. Part II combines the quantitative and the qualitative approaches to the interpretation of the test as applied to the individual subject. Part III, which takes up most of the volume, is a scoring manual, carefully detailed and well illustrated, with an atlas of scored tests records on which the clinician unfamiliar with the authors' procedures can check his understanding of them. This book is highly specific and technical in its subject matter, and unlikely to be of interest to anyone except those working in the field of clinical psychology. The volume does present in an orderly and careful fashion a new method for evaluating a test, which is widely used. The authors present not only a systematic method of scoring out also integrate their finding with those of others who have used this test experimentally. Furthermore, they indicate the limitations of the test, and, on the other hand, make some stimulating interpretations and hypotheses as to its qualitative meanings. This is a meticulous, excellent, and sound work in the admittedly limited and specific area which it purports to cover.

—*Commander S. V. Thompson, MC, U. S. N.*

Proceedings of The Second Clinical ACTH Conference, Volume 1, Research; and Volume II, Therapeutics; edited by *John R. Mote,* M. D. Volume I, 531 pages, illustrated; Volume II, 716 pages, illustrated. The Blakiston Co., Philadelphia, Pa., publishers, 1951. Price each volume, $8.50.

The rapid increase of study made since the publication of the Proceedings of the First Clinical ACTH Conference necessitated the publication of this work in two volumes, one devoted to research and the other to therapeutics. The format of the previous publication has

been used. The papers are each devoted to a particular aspect of the clinical, biochemical, or physiologic effect of ACTH, in either the normal human being or in different disease states, and are prepared by advanced research workers or seasoned clinicians, who have had wide experience with ACTH. Each paper represents the most recent work in its particular subject. Each topic is enlivened and made critical by a discussion, which follows the article. Illustrative charts are again displayed throughout the books. The editor has maintained a high standard in the volumes, and has wisely restricted Volume I to the more fundamental aspects of ACTH and adrenal cortical function, as well as to the effects of adrenal corticoids on the different tissues under varied conditions of metabolism and physiologic state, in both normal and diseased persons. Volume II is primarily concerned with the effects of ACTH in the treatment of different disease syndromes. Both volumes, however, still deal with fundamental considerations.

This book presents the effects of ACTH on all disease conditions in which the drug has been tried. There are discussions of malignancy, hypothyroidism, myasthenia gravis, ocular diseases, burns, mycotic infections, granulomatous inflammations, the arthritides, endocrine dysfunctions, protozoal diseases, and hepatic disease; this list merely scratches the surface of the content of the text.

No practitioner of medicine should fail to read both of these volumes, because to do so would be to miss an able presentation of the latest knowledge about one of the great medical discoveries of all time, ACTH.—*Commander H. A. Lyons, MC, U. S. N.*

Atlas der pathologischen Anatomie, by *Robert Roessle*, M. D., Emeritus Professor of Pathology, University of Berlin and former Director of the Pathological Institute of the Charity Hospital, Berlin, and *Kurt Apitz*, M. D., one-time Professor and Prosector of the Charity Hospital, Berlin. 298 pages; with 564 illustrations, mostly in color. Georg Thieme, Stuttgart, publisher, 1951. Price about $21.

The foreword explains that preparation of the Atlas was by invitation of the publishers more than 10 years ago. At the beginning, Kurt Apitz was most active in the work, but he died in February 1945 before the work was completed and many of the original illustrations were lost during the war. Roessle emphasizes the fact that this is an atlas of special or systemic pathology, the illustrations being the main feature and the text used to explain and amplify the pictures. "The picture predominates." It is for the use of students, advanced students, and pathologists who have have access to a limited number of autopsies.

With characteristic modesty, Roessle explains that the illustrations are such as can be collected in a large clinic and such as he has used in demonstration courses. They are all in the gross, without any photomicrographs. There are only a few black and white photographs. In some instances, explanatory diagrams (prepared by Mrs. Apitz) accom-

pany the pictures. The illustrations in color are superb with respect to color values, detail, contrast, and selection. The experienced pathologist can imagine himself standing at the autopsy table and seeing the specimens exactly as they are freshly removed. I have never seen so many perfect reproductions of originals, nor anything so uniformly good.

The text serves well to explain the illustrations and to provide a brief survey of background theory. Indeed, it might be used for review purposes in preparation for examinations. Whether it will be translated is not now known, but the pictures are so good an extensive knowledge of German is not necessary to understanding the nature of the lesions. This book can be highly recommended to anyone who wishes elegance in his library, to those who wish to learn about the morphology of disease, and to those who wish to review and modernize their knowledge of special pathology. Professional pathologists would welcome it cordially.—*H. T. Karsner, M. D.*

Roentgen Manifestations of Pancreatic Disease, by *Maxwell Herbert Poppel,* M. D., F. A. C. R., Associate Professor of Clinical Radiology, New York University, Bellevue Medical Center; Associate Roentgenologist, New York University Hospital; Associate Radiologist, Mount Sinai Hospital; Roentgenologist, Welfare Island Dispensary, New York City; Consultant in Radiology, United States Naval Hospital, St. Albans, Long Island, N. Y.; Attending Consultant in Radiology, United States Veterans' Administration Hospital, Bronx, N. Y.; Commander (Medical Corps), United States Naval Reserve. 389 pages; illustrated. Charles C Thomas Publisher, Springfield, Ill., 1951. Price $10.50.

As pointed out in the preface, this book might well have been titled "Roentgen Examination of the Upper Abdomen," as that is what it covers. It is well written and the many illustrations are of superior quality. In some places they are more convincing than the text which tends to be repetitive. There is little or no new material presented, but the book is organized in such a way as to be an excellent reference text for roentgenologists.

The first portion of the book is devoted to a general discussion of embryology, anatomy, and physiology of the pancreas and other organs of the upper abdomen. Many roentgenologists will take exceptions to the author's recommendation as to the method of writing a report, but his method does contain a good check list. There should be no question as to the roentgenologist having full access to history, clinical, and laboratory data prior to giving his opinion.

The author's plea for standardization in the nomenclature of cysts of the pancreas is well taken and the classification he presents seems logical. He also points out that in the 7 percent of the cases of carcinoma of the pancreas that metastasize to bone there are both "blastic" and "lytic" types. His discussion of physiology and pathology of the pancreas is unusually well presented and should be of great interest

to internists as well as surgeons and radiologists. The discussion and illustrations of the changes in the duodenum following acute pancreatitis are not as convincing as is most of the book. The discussion of meconium ileus is quite illuminating and very well presented. The last chapter is given over to differential diagnosis and is in effect a summary of the entire book. It is quite concise and the check lists given should be valuable to a busy practioner.

—*Lt. Col. H. C. Harrell, MC, U. S. A.*

Army Medical Library Classification, Medicine. Preclinical Sciences—QS-QZ, Medicine and Related Subjects—W, 275 pages. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., 1951. Price $1.25.

This book has been long awaited particularly by libraries being organized or by libraries finding it important to reclassify their collections to keep in line with the expanding fields of medicine and the allied sciences. This present system has been in use since a Survey Report on the Army Medical Library published in 1944 recommended that the library be reclassified. Funds for this extensive project were provided by the Rockefeller Foundation. The Classification Committee turned the compilation of the scheme over to Miss Mary Louise Marshall under the direction of representatives from the Survey Committee, the Library of Congress, and the Army Medical Library. Miss Marshall's work was done "in close and constant consultation with physicians. In addition, all available medical classifications, as well as the contents of numerous textbooks in the respective subjects, were studied for arrangement and modern ideas as to inclusiveness in the various fields."

This scheme of classification covers the fields of medicine and related sciences. Extensive use is made of certain of the Library of Congress classification schedules for subjects bordering on medicine and nonmedical reference books. This use is sufficiently general to permit each library to determine its own degree of specificity in application.

The notation for serial publications is noteworthy. These publications fall into five catagories according to type. A special scheme of numbering within several of these catagories makes possible an alphabetical arrangement. Table G makes possible a geographic arrangement of serials (government publications, hospital reports, et cetera) where desirable. Table G is also used where it is important to arrange monographs geographically. Serial publications which are indexes or bibliographies (Cancer Current Literature, Tuberculosis Index, et cetera) are an exception. These are classified as bibliography under the subject covered in the general scheme for monographs.

Main tables for monographic material are broad and follow a natural sequence through preclinical sciences (Q with subdivisions) to medi-

cine and related subjects (W with subdivisions). The preclinical section is mainly general. QS, for instance, includes general and comparative anatomy. Anatomy of a special organ or region is classified under that organ or region in the W series.

A unique feature is the special classification arrangement made for all materials published before 1913. Consequently the complete scheme for monographs need apply only to publications subsequent to that time.

The introduction to the classification scheme contains detailed explanations as to its use. Helpful suggestions are made as to guides which may be followed in classifying tumors, bacteria, et cetera. Difficulties which will be met are noted. Arrangements which may appear as discrepancies are pointed out. Time and use of this classification scheme will best determine how much revision will be necessary in future editions. As it stands it is a tremendous job well done. Without doubt many medical libraries, large and small, will adapt it to their collections.—*J. E. Foulke, A. B., B. S. in L. S.*

New and Nonofficial Remedies, Containing Descriptions of the Articles which Stand Accepted by the Council on Pharmacy and Chemistry of the American Medical Association on January 1, 1951, issued under the Direction and Supervision of The Council on Pharmacy and Chemistry, American Medical Association. 782 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., publishers, 1951.

This book is published annually by the Council on Pharmacy and Chemistry of the American Medical Association. Included are all the articles found acceptable under its rules. Thus an up-to-date therapeutic guide is maintained of new drugs, their action, usage, limitation, and dosage. In comparison with previous revisions, this one has many notable improvements. Sedatives and hypnotics are not listed under under a separate chapter heading as before but are now included under central nervous system depressants and stimulants. The old term "Hematics" has been discarded as a chapter heading and the more appropriate "Agents Affecting Blood Formation and Coagulation" substituted. Most of the sections have been rewritten and a standard style of description of items developed which is time saving and permits more rapid comparison of articles included. There are so many important new drugs included in this revision that an enumeration of even a few would be pedantic. It is strongly recommended that every internist and general practitioner secure a copy of the 1951 revision—*Col. L. J. Numainville, MC, U. S. A.*

Textbook of Organic Chemistry, by *Carl R. Noller,* Professor of Chemistry, Stanford University. 643 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publishers, 1951. Price $10.

Designed for introductory courses in undergraduate organic chemistry, this text conforms closely to the customary forms for developing

this voluminous subject. Few, if any, introductory organic texts published in the past 20 years have successfully departed from the well-established and time-honored methods of presentation, although many authors have attempted to increase salability and to stimulate interest by minor innovations. The author has wisely refrained from such innovations and has offered a straightforward introduction to the subject that should be pleasing and helpful to those who teach organic chemistry to undergraduates. Newer developments in organic chemistry have been included with good judgment in bringing much material up to date while avoiding, for the most part, confusing details of complicated theories and controversial hypotheses. This book should be an excellent teaching aid but it is too limited to serve as an adequate reference for professional chemists. Scientists and specialists in other fields, however, may find it useful for quick reference to basic principles of organic chemistry.—*Lt. Col. M. E. Freeman, MSC, U. S. A.*

Roentgen Anatomy (Roentgen Anatomia), by *David Steel,* M. D., St. John's Hospital, Evangelical Deaconess Hospital, Cleveland, Ohio. 108 full page plates. Charles C Thomas Publisher, Springfield, Ill., 1951. Price $8.

This book consists entirely of reproduced roentgenograms on the right page, with a corresponding line-drawing on the left page. The line drawings have numbers on the important landmarks, with the anatomic names corresponding to the numbers given below. On the right page, beneath the reproduced roentgenogram, the same numbers and names are given in Spanish. All portions of the human body are included, without special examinations such as the use of contrast media of any sort. No discussion is included because the illustrations are self explanatory. The only defects in this book are of minor importance and obvious. In the heart views, the one labeled "first oblique" obviously refers to the right anterior oblique, and the "second oblique" refers to the left anterior oblique view. The roentgenograms used for the illustrations were apparently of better contrast than the reproductions would indicate as these are reproduced slightly dark. This assumption is based on the line-drawings showing some structures not evident on the roentgenogram. This book will be very useful not only to the medical student, but also particularly to residents in radiology and any other person interested in roentgenology.

—*Lt. Col. H. A. Vinson, MC, U. S. A.*

Radiologic Physics, by *Charles Weyl* and *S. Reid Warren, Jr.,* Moore School of Electrical Engineering, University of Pennsylvania, with a foreword by *Eugene P. Pendergrass,* M. D., Director of the Department of Radiology, University of Pennsylvania. 2d edition. 491 pages; illustrated. Charles C Thomas Publisher, Springfield, Ill., 1951. Price $10.50

Material progress in radiologic physics and in methods of teaching has necessitated a thorough revision of the first edition of this book. In the new edition, numerous modifications appear which are clear

and well written. The text provides a valuable and well-tested source of fundamental material, both theoretical and practical, for those engaged in the study and use of physical radiation as applied to medicine. The present volume is divided into two parts: (1) the theory and practice of electrical engineering applied to radiologic apparatus; and (2) the theory and application of radiation physics with reference to x-ray diagnosis and x- and gamma-ray therapy.

In addition to the physics of x-ray and radium, there is an excellent discussion of the measurement of radioactive emissions; physical aspects of therapeutic and tracing technics; equivalent dose for x-rays and radioactive materials; and a section on radiologic protection including applications and problems related to radioisotopes, roentgenography, and roentgenoscopy.

The book is intended primarily as a textbook for physicians who are studying radiology as a specialty. The authors assume no knowledge of mathematics and proceed gradually from the most elementary considerations to advanced material. By bridging the gap between little or no knowledge and advanced specialization, this book not only supplies the needs of studient radiologists but materially aids the information of practicing radiologists about contemporary physical theories and their applications to radiology. The book serves the additional purpose of providing the radiologic physicist and technician with essential fundamental information.—*Lt. Col. M. Dauer, MSC, U. S. A.*

Anatomy in Surgery, by *Philip Thorek*, M. D., F. A. C. S., F. I. C. S., Assistant Clinical Professor of Surgery (Formerly Assigned to Gross and Topographic Anatomy), University of Illinois College of Medicine; Diplomate of the American Board of Surgery; Associate Professor of Topographic Anatomy and Clinical Surgery, Cook County Graduate School of Medicine; Member of the American Association of Anatomists; Fellow, American College of Chest Physicians; Co-Surgeon in Chief of the American Hospital; Associate Attending Surgeon of the Cook County Hospital; Senior Attending Surgeon of the Alexian Brother's Hospital. 970 pages; 720 illustrations. J. B. Lippincott Co., Philadelphia, Pa., publisher, 1951. Price $22.50.

This book represents the author's experience in many years of teaching anatomy. The material is so arranged that embryologic, practical, and surgical considerations are included along with the descriptive anatomy. The author's style is concise and clear. The illustrations are excellent and many are in color and are presented in third-dimensional views. This type of illustration is of value to the student as well as to the surgeon. The lymphatic system is clearly and extensively illustrated. This constitutes a real contribution to the subject. The anomalies of the recurrent laryngeal nerve and the variations of the cystic artery, of great importance to the surgeon, are also clearly depicted. This book is recommended to the surgeon as reference or for a refresher course in anatomy.

—*Commander J. G. Stubenbord, MC, U. S. N.*

Adventure in Mental Health, Psychiatric Social Work with the Armed Forces in World War II. A Symposium by: *Betty P. Broadhurst, Irving Brodsky, Elwood W. Camp, Almena Dawley, Ethel L. Ginsburg, Irving Greenberg, Frank T. Greving, Sidney Hechter, Alfred J. Kahn, Henry S. Maas, Daniel E. O'Keefe, Daniel L. Prosser, Myron J. Rockmore, Elizabeth H. Ross, Forrest H. Whitney,* and *Imogene S. Young.* Edited by *Henry S. Maas,* 334 pages. Columbia University Press, New York, N. Y., publisher, 1951. Price $4.50.

This symposium deals primarily with the experiences of 16 writers in psychiatric social work during World War II. It records the growth in stature and position of this profession. Each author has contributed an account of his or her problems encountered during this period and a description of how they were solved. One feels throughout the entire book the struggle of this group for recognition and appreciation, and shares with the authors the gratification which comes from the attainment of their objective.

Henry S. Maas has done an excellent piece of work in editing this book which will be of interest to psychiatric social workers as a historical account of a significant period of development, as well as a fund of information concerning the solution of current problems arising within present-day activity in this field. Although dealing mainly with military aspects of the subject the authors have widened the scope to include civilian potentialities and have somewhat ambitiously projected their horizons into the field of treatment. It was especially gratifying to me to note the emphasis by most authors of the concept of the psychiatric team. Such a team can give the patient the benefit of all disciplines and the tendency toward overemphasis of any one phase is minimized.—*Lt. Col. H. E. Wilkinson, MC, U. S. A.*

The Mechanisms of Cell Division, by *M. J. Kopac* (Conference Chairman), *H. W. Beams, A. M. Brues, H. W. Chalkley, R. Chambers, G. H. A. Clowes, E. G. Conklin, I. Cornman, M. E. Cornman, A. J. Dalton, J. S. Friedenwald, E. B. Harvey, M. Levine, W. H. Lewis, R. C. MacCardle, D. Marsland, L. Reitz,* and *A. H. Sparrow.* Editor, *Roy Waldo Miner;* Associate Editor, *B. J. Henegan;* Consulting Editor, *M. J. Kopac.* Taken from Annals of The New York Academy of Sciences, Vol. 51, Art. 8, pages 1,279-1,546; illustrated. The New York Academy of Sciences, New York, N. Y., publishers, March 23, 1951. Price $3.50.

This symposium is another example of the excellent series of symposia sponsored by the New York Academy of Sciences. The contributors are active investigators in the field of cytologic physiology. The following topics are covered in detail: (1) the mechanism of cleavage and differentiation in cells; (2) the role of mitochondria, Golgi bodies, and cytoplasmic inclusions in mitosis; (3) the effect of micrurgy and chemical substances such as colchicine, nitrogen mustards, and podophyllin; (4) the effect of ionizing radiation; (5) the relative radiosensitivity of cells to the mitotic cycle; and a theoretical

971621 O - 51 - 12

consideration of ultrastructures involved in cell division. In general the contributors have presented scholarly reviews with clear-cut opinions on the current status of the problems concerned. The dean of American cytologists, Edwin G. Conklin, contributes a valuable philosophic dissertation on tolerance among scientists and examples illustrating the contributions by pure morphology and pure general physiology. He humorously points out that the "so called artefacts" are often normal real facts and fertile ground for biophysical investigation. This symposium is a desirable reference book for the scientist interested in the mechanics of cell division, and the experimentalist in cancer therapy, and will aid the clinician in his understanding of the tools with which he fights cancer.

—*Commander E. P. Cronkite, MC, U. S. N.*

Medicinal Chemistry, Volume I, A Series of Reviews Prepared under the Auspices of the Division of Medicinal Chemistry of the American Chemical Society. Editorial Board, *C. M. Suter,* Editor-in-Chief; F. F. *Blicke, Kenneth N. Campbell, Ed. F. Degering, Walter H. Hartung, Peter K. Knoefel, Maurice L. Moore, R. O. Roblin, Jr., Leon A. Sweet,* and *Glenn E. Ullyot.* Associate Editors; *George W. Anderson, A. C. Bratton, Jr., Johannes S. Buck, Robert R. Burtner, Thomas P. Carney, C. J. Cavallito, Edwin J. Fellows,* and *John Lee.* 473 pages; illustrated. John Wiley & Sons, Inc., New York, N. Y., publishers, 1951. Price $10.

The chief object of this book is to include in each chapter references to all the compounds that have been tested for a particular type of pharmacologic activity. This first volume of a series includes the following sections, each written by a researcher active in the particular field discussed: antithyroid compounds, antispasmodics, antibiotics, benzoates as local anesthetics, and analgesics. In each section the chemistry, structural relationship, preparation, and methods of testing of the classes of drugs under discussion are given. In each section there are comprehensive reference tables, together with a wealth of bibliographic references. This volume will be welcomed as a ready reference work, particularly by pharmacologists, chemists, and graduate students, who are engaged in the synthesis and evaluation of new compounds and drugs.—*Commander H. C. Dudley, MSC, U. S. N.*

Clinical Unipolar Electrocardiography, by *Bernard S. Lipman,* A. B., M. D., Assistant in Medicine, Emory University School of Medicine, Atlanta, Ga.; and *Edward Massie,* A. B., M. D., F. A. C. P., Assistant Professor of Clinical Medicine, Washington University School of Medicine; Director of Heart Station, Barnes Hospital, St. Louis; Director, Cardiovascular Clinic, Washington University Clinics. 232 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., publisher, 1951. Price $5.

This short, compact manual is based on notes and the teaching aids used by the authors in their instruction courses. It is simply written; the terminology is clearly explained; and the text is superbly illustrated by diagrammatic sketches and illustrative ECG's. The

basic principles of electrophysiology are described and illustrated with utmost simplicity. A student beginning with a manual of this type is likely to develop the habit of interpreting ECG's on an intelligent basis of reasoning rather than from memory of empirical "patterns" or matching with labeled illustrative ECG's. The authors unfortunately referred too frequently to "patterns" and have included illustrative tracings which might be wrongly used.

This book contains no new concepts, the basic material supporting the information given therein being taken from 219 references listed in the bibliography. The simple method of presentation of this material is, however, new and makes this one of the best texts on the subject of unipolar electrocardiography that is presently available. The manual is intended for the beginner and therefore should be ideal for the student but should likewise be valuable for the practitioner who desires to expand his knowledge by a workable understanding of unipolar electrocardiography.—*Col. T. W. Mattingly, MC, U. S. A.*

A Textbook of Medicine, edited by *Russell L. Cecil*, M. D., Sc. D., Professor of Clinical Medicine Emeritus, Cornell University, New York, and *Robert F. Loeb*, M. D., Bard Professor of Medicine, Columbia University, New York. Associate editors, *Alexander B. Gutman*, M. D., Professor of Medicine, Columbia University, New York; *Walsh McDermott*, M. D., Associate Professor of Medicine, Cornell University, New York, and *Harold G. Wolff*, M. D., Associate Professor of Medicine (Neurology), Cornell University. 8th edition. 1,627 pages; illustrated. The W. B. Saunders Co., Philadelphia, Pa., publishers, 1951. Price $12.

It would be impossible in this review to comment on each entity or to remark about each change, whether addition or deletion, in this excellent volume. It would also be unfair merely to "hit the high spots." Therefore, I shall try to present my impression of the book as a whole. The authors and contributors are to be congratulated for presenting such a complete, well-integrated textbook and at the same time shorten the book by about 136 pages. This is quite a feat in view of the numerous and important advances made in the 4 years since the seventh edition was published. This has been accomplished by the use of a smaller type but in spite of this the book is not appreciably more difficulty to read. Dr. Cecil also points out in the preface that the book was shortened without the sacrifice of any important material despite the fact that about 20 articles covering subjects not discussed in previous editions are to be found in this one.

As in the older editions, the subject matter is well organized with a discussion of each entity in the logical sequence of definition, etiology, epidemiology, pathogenesis, symptoms, diagnosis, prognosis, and treatment. The many illustrations are clear, appropriately placed, and include a few excellent color plates. Forty tables are found throughout the book and offer an excellent source of quick reference. The table of normal laboratory values of clinical importance on page 1,551

shows several important changes and now lists the values of several chemical constituents only in milliequivalents per liter which is in keeping with current usage.

Frequent reference is made to the use of the newer therapeutic agents such as chloromycetin, terramycin, cortisone, and ACTH, as well as certain surgical procedures. Newer concepts in diagnosis, pathology, and pathophysiology are likewise mentioned. References are up to date and afford the reader an opportunity of further investigation or reading where desired. The senior editor has been joined by Robert F. Loeb as co-editor and by Alexander Gutman, Walsh Mc Dermott, and Harold G. Wolff as associate editors. The book continues to be outstanding in its field, an invaluable aid to student and specialist alike.—*Commander M. M. Driskell, MC, U. S. N.*

Human Physiology, by *Bernardo A. Houssay*, M.D., Professor of Physiology, Director of the Institute of Biology and Experimental Medicine, Buenos Aires, Argentina; *Juan T. Lewis*, M.D., Professor of Physiology, Director of the Institute for Medical Research, Rosario, Argentina; *Oscar Orías*, M.D., Professor of Physiology; Director of the Mercedes, and Martin Ferreyra Institute for Medical Research, Córdoba, Argentina; *Eduardo Braun Menendez*, M.D., Professor of Physiology, Member of the Institute of Biology and Experimental Medicine, Buenos Aires, Argentina; *Enrique Hug*, M.D., Professor of Pharmacology of the School of Medicine, Rosario, Argentina; *Virgilio G. Foglia*, M.D., Professor of Physiology, Member of the Institute of Biology and Experimental Medicine, Buenos Aires, Argentina; and *Luis F. Leloir*, M.D., Director of the Institute for Bio-chemical Research, Campomar Foundation, Buenos Aires, Argentina. Translated by *Juan T. Lewis*, M.D., and *Olive T. Lewis*, with a foreword by *Herbert M. Evans*, M.D. 1117 pages; illustrated. McGraw-Hill Book Co., Inc., New York, N.Y., publisher, 1951. Price $4.

This is an excellent, comprehensive, and up-to-date book. The practical application of human physiology predominates throughout. The research aspects, although referred to, are not overemphasized. The method of presentation of each subject separately, with rather extensive additional references, makes this an ideal reference book for the busy practitioner. In addition the straightforward presentation of the subject under discussion, with ample illustrations make it an outstanding text book for the medical student.—*Col. A. E. White, MC, U.S.A.*

Large Quantity Recipes, by *Margaret E. Terrell*, M.A., Professor of Home Economics and Director of University Dining Halls, University of Washington, Seattle, Wash. Cartoons by *Jean McConnell*. Selected and Tested Under the Sponsorship of The American Dietetic Association. 414 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., publisher, 1951. Price $7.

This is a modern, up-to-date, and utilitarian version of what the food service manager has waited for, in the way of tried, tested, and proved large quantity recipes. The recipes are presented in excellent sequence, and in an easily readable form. The many helpful tips that

emphasize important cookery and preparation points will be welcomed by the experienced and understood by the inexperienced. The book is not cluttered with material never used. The few tables included are accurate and practical.

A wide variety of recipes are given and the newer concepts of cookery are included, as for example the section on ready mixes.
—*E.M. Girard, WMSC, U.S.A.*

Enzymes and Enzyme Systems, Their State in Nature, edited by *John T. Edsall, A. L. Lehninger, David E. Green, Emile L. Smith, Andreas C. Maehly, Britton Chance, Edwin J. Cohn, Douglas M. Surgenor,* and *Margaret J. Hunter.* 146 pages; illustrated. Harvard University Press, Cambridge, Mass., publishers, 1951. Price $2.75.

This monograph is based on seminars and discussions from the University Laboratory of Physical Chemistry Related to Medicine and Public Health, Harvard University, by workers on enzymes and enzyme systems from widely separated laboratories. The first two chapters by Lehninger and Green deal with the highly complex systems of interrelated enzymes within the mitochondria. In the third chapter, Emile Smith presents evidence for the importance of many metallic ions in the action of enzymes. Maehly, in the fourth chapter, describes the separation of peroxidase into its component parts and the process of resynthesis from those parts. Chance then shows the quantitative interrelations of certain heme enzymes and demonstrates the great speed with which some of these reactions between large molecules can take place. These papers are highly technical in nature and would be of primary interest to the enzyme chemist. The last chapter by Cohn, Surgenor, and Hunter on the state in nature of proteins and protein enzymes of blood and liver would be of interest to the physician engaged in experimental medicine.—*Commander W. A. Dinsmore, Jr., MC, U.S.N.*

Parasitic Infections in Man, edited by *Harry Most.* Symposium held at the New York Academy of Medicine March 15 and 16, 1949. 229 pages; illustrated. Columbia University Press, New York, N.Y., publisher, 1951. Price $4.50.

This is one of a series of symposiums held under the auspices of the Section on Microbiology at the New York Academy of Medicine in March 1949. As stated in the foreword by Gregory Schwartzman, "Unpublished symposia are soon forgotten, but their benefits may be retained by prompt publication." The following papers were included: The World Health Importance of Parasitic Diseases by Paul F. Russell; The Significance of New Findings in the Life Cycle of Malarial Parasites by Clay G. Huff; Immunological Mechanisms in Parasitic Infections by James T. Culbertson; Immunological Diagnosis of Parasitic Diseases by John Bozicevich; Diagnosis of Intestinal Helminths and Protozoa by Norman R Stoll; Studies on Growth and Metabolism of Endamoeba Histolytica by William W. Frye; the Physiology of Blood

Flagellates by Theodor von Brand; Biochemistry and Metabolism of Malarial Parasites by Ralph W. McKee; The Cultivation of Malarial Parasites by Quentin M. Geiman; Metabolism of Helminths by Ernest Bueding; Pharmacologic Evaluation and Clinical Application of Amebacides, With Special Reference to the Thioarsenites by Hamilton H. Anderson; The Status of Antimalarial Drugs by G. Robert Coatney; Theory of Filariasis and the More Common Intestinal Helminths by H. W. Brown; and The Treatment of Schistosomiasis by Frederick J. Brady. Each chapter is followed by a good bibliography.

—*Capt. B. A. Cole, MSC, U.S.A.*

Oral Rehabilitation, Complete Occlusal Reconstruction, Treatment of Dental Deformities and Related Subjects, The Closed Bite, by *Jerome M. Schweitzer*, B.S., D.D.S., Consulting Dental Surgeon, Woman's Hospital, New York City; Postgraduate Instructor in Prosthetics, First District Dental Society, New York City; Associate Fellow New York Academy of Medicine; Fellow American Academy of Dental Medicine. 1161 pages; with 1157 illustrations. The C. V. Mosby Co., St. Louis, Mo., publisher, 1951. Price $20.

This valuable, well illustrated text includes the author's personal experiences in the field of oral rehabilitation and a review of the pertinent literature. The author presents a comprehensive anatomic, physiologic, and biomechanical discussion of the effects of loss of vertical dimension and malocclusion on the temporomandibular articulation and the resultant changes of the articulation on related and associated structures. The work of other investigators is reported without bias. The effects of various factors on the temporomandibular joint are controversial and the pros and cons are given in almost all instances.

The anatomy of the temporomandibular joint, ear, muscles of mastication, and the related structures is given. The author discusses the arguments for and against the consistency of the temporomandibular joint during life, as well as the various movements of the joint. Good roentgenograms of the joint are necessary for proper diagnosis. Several roentgenographic technics are illustrated and discussed. Treatments and surgical and nonsurgical technics for the correction of certain derangements of the temporomandibular joint are presented. Almost two hundred pages are devoted to the presentation of an extensive review of the literature covering the neuroses attributed to the dysfunction of the temporomandibular joint.

Complete understanding of occlusion, muscle balance, various types of occlusion, normal vertical dimension, and the freeway space is necessary for successful management of oral rehabilitation. Occasionally the orthodontist can be of invaluable aid in the management of the case. After the author completely covers the information needed prior to attempting a complete oral reconstruction, he presents several functional and several anatomic technics. These are accompanied with detailed illustrations of each step involved.

This book is well written and easily understood. The profuse use of illustrations is helpful in the understanding of the problems and solutions presented in the text. The bibliographies at the end of each chapter are exceptionally complete. This volume is recommended, not only to the specialist, but to the general practitioner as well.

—*Lt. Col. E. H. Smith, Jr., DC, U.S.A.*

After the A Bomb? (Emergency Care in Atomic Warfare), Edited by *Charles F. Behrens*, M.D., Commanding Officer, Naval Medical Research Institute, National Naval Medical Center; Director, Atomic Defense Division, Bureau of Medicine and Surgery, Navy Department. 182 pages. Thomas Nelson & Sons, New York, N.Y, publisher, 1951. Price $2.50.

This treatise describes in concise and practical form both the broad and detailed plan of organization for the management of atomic bomb casualties. The text is divided into eight convenient chapters dealing with general considerations, rescue and first aid, care of burns, treatment of radiation illness, hospital and public health problems, and the management of personnel contaminated with radioactive materials, each chapter contributed by an expert in his particular field. A table of remedial agents is included. As the editor states, a wealth of source material, dealing with atomic blast and radiation injury, is available, but a concise treatise in handbook format outlining the responsibilities applicable to both civilian and military agencies seems most appropriate at this time. A reasonably extensive bibliography and handy index are included.—*Lt. Col. O. A. Wurl, MC, U.S.A.*

A Review of Medicine, by Members of the Faculty, Northwestern University Medical School. Edited by *Benjamin Boshes*, M.D., M.S., Ph.D., Associate Professor of Nervous and Mental Diseases, Northwestern University Medical School; Attending Neuropsychiatrist, Passavant Memorial and St. Luke's Hospitals, Chicago, Ill., and Senior Consultant in Neurology, Veterans Administration Hospital, Hines, Ill. 6th edition, revised, appended, and reset. 814 pages. Northwestern University Medical School, Evanston, Ill., publisher, 1951. Printed by The Chief Printing Co., Chicago, Ill. Price $15.

This book, with its unusual background has been rewritten from cover to cover with new chapters and sections since the last printing 8 years ago. Eighteen years ago the first typewritten and mimeographed edition of the "Cook County Notes" was edited as a series of lectures at Northwestern University Medical School and 16 years ago the first lithographed "Lectures of the Cook County Hospital Quiz Course." In 1940, with the fourth edition, the current name was adopted. To facilitate easy reading, the material for the most part is presented in a running narrative style.

The chapter on general medicine is concerned mainly with the infectious diseases, diseases of the lung and pleura, and diseases of the cardiovascular renal system. Some of the subjects such as lobar pneumonia, typhoid fever, and diphtheria for example, have relatively too much space allotted them. The chapter entitled "Special Lectures

on Medicine" contains an excellent new section on tuberculosis which presents an admirable scholarly discussion of the subject. The sections on the blood diseases present good workable clinical outlines. The new section on antibiotics and sulfonamides is a valuable addition. The sections on general surgery, diseases of the thyroid, and peptic ulcer are exceptionally good. The chapter on "Special Topics in Surgery" has new sections on spinal cord injuries and gangrene. The new section on cancer presents a well rounded practical discussion. The last half of the book presents a practical review of obstetrics, gynecology, genitourinary surgery, orthopedics, pediatrics, otolaryngology, ophthalmology, neurology, and dermatology. The authors have tried to discuss the diseases peculiar to these specialties in a manner helpful to the general practitioner. For the most part these special subjects are well handled, although in a few places academic details are too space consuming. The chapter on neurology has many well prepared sections. The chapter on dermatology has been given considerable space which is a refreshing departure from the scanty attention this subject receives in most medical schools. Tuberculosis of the skin is discussed at too great length. The chapter on total approach to diagnosis (a discussion of psychosomatic medicine) is much too short when one considers its current medical importance. A few sections throughout the book are not up to date, especially in regards to treatment with newer antibiotics, DDT, cortisone, ACTH, and other remedies.

—*Lt. Col. Richard I. Crone, MC, U.S.A.*

Handbook of Pediatric Medical Emergencies, by *Adolph G. DeSanctis*, M.D., Professor of Pediatrics and Chairman of the Department of Pediatrics, Post-Graduate Medical School, New York University-Bellevue Medical Center; Director of Pediatrics, University Hospital, New York University-Bellevue Medical Center; Director of Pediatrics, Gouverneur Hospital, New York City, and *Charles Varga*, M.D., Instructor in Pediatrics, Post-Graduate Medical School, New York University-Bellevue Medical Center; Assistant Attending Pediatrician, University Hospital, New York University-Bellevue Medical Center; Assistant Visiting Pediatrician, Gouverneur Hospital, New York City. 284 pages; with 51 illustrations. The C. V. Mosby Co., St. Louis, Mo., publishers, 1951. Price $5.

This small handbook deals with some of the more common medical emergencies met with in the practice of pediatrics. It covers cardiovascular, gastrointestinal, genitourinary, neurologic and respiratory emergencies, drowning, poisoning, care of the premature, and pediatric procedures. The material is presented in outline form. Details pertaining to any method of therapy would have to be obtained elsewhere. The chapters on the care of the premature infant and pediatric procedures are particularly good. A useful table which lists a large number of commercial sources of poisons is included in the appendix.

—*Col. C. L. Milburn, Jr., MC, U.S.A.*

History of Pharmacy, A Guide and a Survey, by *Edward Kremers,* Ph.G., Ph.M., Ph.D., Sc.D., Late Director, Course in Pharmacy and Professor of Pharmaceutical Chemistry, University of Wisconsin, and *George Urdang,* Ph.G., D.Sc. Nat., Sc.D., Professor of the History of Pharmacy, University of Wisconsin, and Director of the American Institute of the History of Pharmacy. 2d edition, revised and enlarged. 622 pages; 30 illustrations. J. B. Lippincott Co., Philadelphia, Pa., publishers, 1951.

Although principally of interest to pharmacists and students of pharmacy, the concomitance of pharmacy and medicine, indeed their identity until recent times, makes this book a worthy addition to the libraries of physicians. Only two-thirds of the pages are devoted to text and these are devoted principally to the growth of pharmacy in the United States although the general development from ancient times is adequately outlined in the initial portion of the book. The remaining one-third of the pages contain an extensive bibliography, chronology, appendix, and index adding greatly to the value of the book as a reference work. Chapter 11 gives a brief description of the origins of the Army Medical Corps and chapter 18 has a subchapter entitled "The Pharmacist in the Armed Forces." The print is clear, but notations and quotes in fine print tend to interrupt continuity and might better have been placed in the appendix or as footnotes. Halftone illustrations having no relationship to the adjacent text are grouped in the middle of the book. Good histories of medicine and its allied sciences and branches are needed. The "History of Pharmacy" helps to meet that need.—*Lt. E. S. Redfield, Jr., MC, U.S.N.*

Methods in Medical Research, Governing Board: *Irvine H. Page,* Chairman; *A. C. Ivy, Colin M. MacLeod, Carl F. Schmidt, Eugene A. Stead,* and *David L. Thomson.* Volume IV. *Maurice B. Visscher,* Editor-in-Chief; Histochemical Staining Methods; *George Gomori,* Editor; Fluid and Electrolyte Distribution, *Louis B. Flexner,* Editor; Studies on Gastrointestinal Pressures, Innervation and Secretions, *J. P. Quigley,* Editor; Tissue Culture Methods, *C. M. Pomerat,* Editor. 306 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1951. Price $7.

This fourth volume of the series has maintained the general excellence of its predecessors in the presentation of technical knowledge. It presents detailed methodology including critical and comparative comments and the discussion of principles. Information on working methods for medical investigation is made available in a reliable and inclusive form. Volume 4 has a section devoted to: histochemical staining methods, fluid and electrolyte distribution, studies on gastrointestinal pressures, innervation and secretions, and tissue culture methods. A competent authority has acted as associate editor for each section. The book fulfills a need for the medical research worker in presenting the methods of study for investigation in a detailed descriptive fashion by individuals who have had a large practical experience. It is doubtful that a similar compilation and availability of material on methodology can be found published.—*Commander H.A. Lyons, MC, U.S.N.*

Practical Section Cutting and Staining, by *E. C. Clayden*, F.I.M.L.T., Senior Technician in the Morbid Histology Department of the Bland-Sutton Institute of Pathology, the Middlesex Hospital, London. 129 pages; 21 illustrations. Chemical Publishing Co., Inc., Brooklyn, N.Y., publishers, 1948. Price $2.75.

This technical manual, according to the author, is written primarily for technicians with little or no experience in various methods of preparing routine microscopic sections. The author attains his objective very well. He covers the basic principles of histologic technic. About one-half of the book deals with various special technics for demonstrating amyloid, bacteria, calcium, collagen, elastic, fat, fibrin, melanin, mucin, myelin, reticulum, and other substances. Most of the illustrations are diagrams demonstrating materials and technics. This manual is recommended to technicians, both student and graduate, and possibly to pathologists interested in teaching histopathologic technic.—*Lt. P. K. Hamilton, MC, U.S.N.*

A Text-Book of X-Ray Diagnosis by British Authors, in Four Volumes. Volume I. Edited by *S. Cochrane Shanks*, M.D., F.R.C.P., F.F.R., Director, X-ray Diagnostic Department, University College Hospital, London; and *Peter Kerley*, M.D., F.R.C.P., F.F.R., D.M.R.E., Director, X-ray Department, Westminster Hospital; Radiologist, Royal Chest Hospital, London. 2d edition. 434 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publisher, 1951.

It has been 10 years since the publication of the first edition of this British text which provided a comprehensive survey in diagnostic radiology in 3 volumes. The new edition consists of 4 volumes with subdivision into the head and the neck, the chest, the abdomen, and the bones and joints. Such a subdivision is convenient for the radiologist as well as the clinician. In this second edition new ideas in diagnostic radiology have been evolved and old misconceptions discarded. Volume 1 deals with the central nervous system, the teeth and jaws, the eye, the accessory nasal sinuses, and the temporal bone. The new chapter on cerebral angiography is excellent and includes radiographs and diagrams of the normal. The section on eye is devoted mainly to the localization of foreign bodies. The contact lens method of localization which has attained popularity in the Armed Forces is only mentioned.—*Commander C. Asher, MC, U. S. N.*

Oral Physiology, by *John T. O'Rourke*, B.S., D.D.S., Sc.D. Edited by *Leroy M.S. Miner*, M.D., D.M.D., Sc.D., Dr.P.H., Boston. 333 pages. The C. V. Mosby Co., St. Louis, Mo., publisher, 1951. Price $5.

This book was written to refute the remark "--- that teeth are trivial." To prepare his case the author has thoroughly reviewed the literature pertinent to the subject. The fact that because of longer life expectancy today more people survive to the upper age levels with a consequent increase in tooth exposure time is emphasized throughout the book. A logical assumption, the author states, is that "there is now a

greater prevalence of dental disease and loss of teeth." The first chapter presents statistics on loss of human teeth from caries, periodontal disease, and malocclusion which indicates that a significant number of people will be handicapped from the standpoint of masticatory function by age 50. Chapter 2 develops the theme that mastication is the chief function of the mouth. Impaired or destroyed masticatory apparatus imposes an increased burden on the alimentary tract whereas the alternative change to a soft, predominantly cooked diet predisposes to nutritional inadequacies.

Chapter 3 is concerned with the purposes of mastication and its mechanics. The parts played by the muscles, tongue, palate, lips, cheeks, and gums are considered separately. The temporomandibular articulation is reviewed as is the rest position. The act of mastication, the number of chews or length of mastication, and an evaluation of the dentition in terms of masticatory efficiency including strength of bite with natural and artificial dentition is discussed. Other aspects of mastication are discussed in detail throughout the book; single chapters are devoted to one aspect of the masticatory function. The concluding chapter discusses the relation of the physical character of the diet to the health of the supporting dental tissues. A bibliography is given for each chapter. The book is a distinct addition to the dental literature, and should provide an insight into dental problems for kindred branches of the healing profession.

—*Capt. E. G. F. Pollard, DC, U.S.N.*

Immunology, by *Noble Pierce Sherwood*, Ph.D., M.D., F.A.C.P., Professor of Bacteriology, University of Kansas, and Pathologist to the Lawrence Memorial Hospital, Lawrence, Kans. 3d edition. 791 pages; illustrated. The C. V. Mosby Co., St. Louis, Mo., publisher, 1951. Price $8.

Sherwood has aptly consolidated the findings of the past decade with the previous knowledge by omitting material from his previous editions considered as obsolete or superfluous and enriching each chapter with references to the recent findings in each branch of this field. His text is basically concerned with the equilibrium that exists in the interaction between parasite and host and the intricate phenomena that may shift this balance in one direction or the other. Although this well-written and easily-understood textbook is primarily intended for the medical student, it will be of great value to anyone desiring to become familiar with the basic principles of a field of medical science that is still in its infancy.

Emphasis is placed throughout the book on the changing points of view relative to natural and acquired immunity and allergy. New topics touched on in this latest edition are the new blood group factors as the anti-Lutheran, anti-Willis, anti-Levay, anti-Kell and, the anti-Cellano factors; the pathogenesis of latent infections, the mechanism of viral infections, the role of the vertebral veins in metastasis, and the relation

of vitamins and endocrines to resistance. Ample space is given to the history and principles of the various diagnostic laboratory tests that are applicable to this field.

The author at times uses the short cut of references in place of full exposition. For example, he states, "A great deal of light is being thrown upon the mystery of how infectious agents establish themselves within a tissue and cause cellular injury, as a result of extensive research in the following fields: (a) The mechanism of action of the sulfonamides (Henry, 1943....." The reader must refer to the article quoted to determine in which way the sulfonamides influence the above phenomenon. A few sentences summarizing the findings in the literature in such cases would greatly enhance the value of the text.

—*Major A. Leibovitz, MSC, U.S.A.*

Medical Dictionary, in Three Parts: English-French-German, French-German-English, and German-English-French. Dr. *E. Veillon*, Editor-in-Chief; with the contribution of *R. Bing*, M.D., Professor of Neurology; *S.S.B. Gilder*, B.Sc., M.B., B.S.; *T. Gordonoff*, M.D., Professor of Pharmacology and Therapeutics; *J. Karcher*, M.D., Hon. Doc. of Internal Medicine; *P. Knapp*, M.D., Professor of Ophthalmology; *F. E. Koby*, M.D., Ophthalmology; *P. Koenig*, M.D., Gynecology and Obstetrics; *E. Ludwig*, M.D., Professor of Anatomy; *W. Lutz*, M.D., Professor of Dermatology; *J. Minder*, M.D., Professor of Urology; *A. v. Muralt*, M.D., Professor of Physiology; *J. L. Nicod*, M.D., Professor of Pathology; *V. Parchet*, M.D., Oto-Rhino-Laryngology; *F. Roulet*, M.D., Professor of Pathology, Anatomy, and Bacteriology; *L. M. Sandoz*, Ph.D., Endocrinology; *H. Schultheiss*, M.D., Professor of Gynecology and Obstetrics; *Cl. Secrétan*, Ph.D.; *G. Töndury*, M.D., Professor of Syst. Anatomy; *Cl. Vuilleumier*, M.D., Surgery; *K. M. Walthard*, M.D., Professor of Physiotherapy and Balneology; *H. de Watteville*, M.D., Professor of Gynecology and Obstetrics; *H. Wirz*, M.D., Physiology and Physiol. Chemistry; *H. Zickendraht*, Professor of Physical Medicine; and *E. A. Zimmer*, M.D., Radiology. Technical and Bibliographic Contributor: *E. Lovasy*. 1,417 pages. Grune & Stratton, Inc., New York, N.Y., publishers, 1950. Price $18.75.

This useful reference book gives the English, French, and German equivalents for medical terms. A book of this size cannot be as inclusive as the single German-English or French-English medical dictionaries (I would estimate that it contains about 30,000 terms in each of the three languages), but its synoptic arrangement makes it more valuable than any other polyglot medical dictionary available. The typography and format are excellent, producing an uncluttered page which makes the information quickly accessible, and the book easy and pleasant to use. Dr. Veillon says in his preface that "the essential limitation of the size of the volume has precluded the inclusion of all terms employed in medicine and its allied sciences, so that we have to be content with a choice of expressions in current use ... The unprecedented development of science in recent years makes it obvious that no dictionary can claim to be complete, or free from some degree of error and omission." The comments which follow merely serve to illustrate some of the difficulties the author confronted.

The German *Fleckfieber* is correctly translated as *typhus fever*, but *Typhus* is translated *typhus fever, typhoid* which may be misleading. On the other hand, the three meanings of *Blase (bladder, vesicle, blister)* are carefully differentiated. Among the many compound words beginning with *Blut-, Blutsparung (hemostasis)* does not appear, although *Blutstillung* does; *Blutversorgung (blood supply)* is not listed. *Magenbrennen* and *Sodbrennen* are identical *(heartburn)*; whereas the French equivalent *aigreurs* is given for the latter, it is omitted under the former. There are many cases of unnecessary cross references *(e.g. Magengrube, see Herzgrube)*- umecessary because the definitions could be given in each place just as economically, and much more conveniently for the user. In some sections of the book there seems to be an excessively thorough listing of Graeco-Latin terms which vary in the three languages only in their endings *(e.g. hysteromyomectomy, hysteroovariotomy, hysteropexy, et cetera)*. The good points of this book, however, far outweigh its shortcomings. Most medical men will find it a very practical and helpful dictionary.

—*Lt. Col. F. B. Rogers, MC, U.S.A.*

Manual of Massage and Movements, by *Edith M. Prosser*, T.M.M.G., Trained Nurse and Certified Midwife. Member of Council of Chartered Society of Massage and Medical Gymnastics 1936-44; Sister in Charge Massage Department and Principal of School 1930-1949; continuing Examiner for Chartered Society of Physiotherapy at the Middlessex Hospital, London, since 1928. 388 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., publisher, 1951. Price $6.

This book begins with a complete discussion of technic, application, contraindications and physiologic effects of massage. The portion that deals with therapeutic exercise, begins with a discussion of the law of gravity and its relation to the human body. There are illustrations and a detailed discussion of exercise, axes and planes of movement, properties of muscle, classification of movements, and when and how to apply each type of exercise, plus the fundamental positions of all exercise. Every joint in the body is described clearly and specifically. The description includes the axes, planes, and possibilites of motion with the muscles of each joint. Match-stick figures are used to illustrate points and may be easily copied. Five pages are devoted to the examination of the spine. The last three chapters are written about deformities of the spine with suggested corrective exercises. This manual is a good reference book to have in a rehabilitation department.—*Lt. F. M. Frazier, NC, U.S.N.*

Diagnostic Standards and Classifications of Tuberculosis, 1950 edition. 64 pages. National Tuberculosis Association, New York, N.Y., publisher, 1950.

This new edition of a familiar pamphlet incorporates new material and revisions. A new classification of pulmonary tuberculosis is presented in this manual.—*Commander H. A. Lyons, MC, U.S.N.*

A History of Neurological Surgery, edited by *A. Earl Walker*, M.D., Professor of Neurological Surgery, The Johns Hopkins University. Contributors: *William J. Atkinson, Kenneth M. Browne, John V. Crawford, Robert G. Fisher, Robert E. Green, Herbert C. Johnson, James Markham, Curtis Marshall, Desmond C. O'Connor, W. Eugene Stern, Alfredo F. Thomson,* and *A. Earl Walker*. Editorial Committee: *Robert E. Green, Herbert C. Johnson,* and *W. Eugene Stern*. 583 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., publisher, 1951. Price $12.

During the winter of 1949-50 at Johns Hopkins University a number of seminars were held on the history of the development of neurosurgery. The papers, by members of the Division of Neurological Surgery are here collected and constitute the first adequate history of this recently established specialty. Surgical technics; the development of surgical approaches to anatomic areas such as the posterior fossa, the hypophysis and the third ventricle; the progress of psychosurgery; and operations for pain, epilepsy, and diseases of the peripheral nerves are discussed. Some of the information was gleaned from as long ago as 3000 B.C., from periods of Babylonian and Egyptian cultures and from the pre-Columbian era in Peru. There are 14 biographic sketches of the pioneers of neurosurgery during the twentieth century. These are concise, brief, informative, and are scattered throughout the book in two-page interludes between chapters. An extensive bibliography is given for each chapter.

The appeal of this book will be mainly for neurosurgeons, but the history of the development of the fundamentals of neurosurgery will be of interest and value to neurologists, neuropathologists, and neurophysiologists. It will prove valuable to the student and the experienced neurosurgeon and will please the older neurosurgeons for it reveals their own participation in the rapid improvements in their specialty. The courage of the twentieth century neurosurgeon is frequently shown in the clarification of facts previously shrouded in fear and ignorance. To the young student the book shows a direction of purpose. The description of the fundamentals involved in the past and present problems points the way to solutions which will inspire him. A book of this nature will help the student to consolidate some of the myriads of scattered data in his increasing fund of knowledge. To the practicing neurosurgeon it is beneficial to read of the difficulties encountered by predecessors and the solution of these difficulties by their clinical application of anatomic, physiologic, and histologic principles.

—*Lt. Comdr. G. Clark, MC, U.S.N.*

Annual Review of Medicine, Volume 2, by *Windsor C. Cutting*, Editor, Stanford University School of Medicine, and *Henry W. Newman*, Associate Editor, Stanford University School of Medicine. 485 pages. Annual Reviews, Inc., Stanford, Calif., publisher, 1951. Price $6.

This recent addition to the series of Annual Reviews follows the familiar pattern. The broad interpretation of the term "Medicine" is indicated by the inclusion of comments on medicine in a famine by

Meiklejohn, diseases of the male reproductive system by Nelson and Heller, social psychiatry by Lindemann and the general adaptation syndrome by Selye. The article on physical agents and trauma by Behnke of the Navy Medical Corps and the discussion of rheumatic diseases by Kuzell were especially interesting. There are many references to ACTH and cortisone throughout the book. Extensive bibliographies complement each article.

—*Commander H. J. Alvis, MC, U.S.N.*

Human Engineering, by *L. E. Abt* (Conference Chairman), *L. S. Beals, Jr., A. C. Blaschke, J. G. Catranis, A. Chapanis, H. D. Eberhart, H. Elftman, H. H. Hausner, V. T. Inman, W. E. Kappauf, J. L. Kennedy, L. C. Mead, R. A. McFarland, C. P. Seitz, W. M. Smith,* and *C. L. Taylor,* Editor, *Roy Waldo Miner;* Associate Editor, *B. J. Henegan;* Consulting Editor, *Lawrence Edwin Abt.* Volume 51, Art. 7. Pages 1123-1278 of Annals of The New York Academy of Sciences; illustrated. The New York Adademy of Sciences, New York, publishers, 1951. Price $2.75.

This monograph consists of a series of articles resulting from a conference held by the Section of Psychology of the New York Academy of Sciences. The various chapters are unique and self-sufficient. No attempt has been made to write a textbook in logical sequence. The articles clearly elucidate the meaning of the phrase "human engineering," give many examples of problems in the field, and describe in detail the methods used in meeting specific problems. The definition given in the book limits human engineering almost exclusively to "engineering psychology." It is stated that the problems of human engineering are problems of engineering, medicine, and psychology. This is brought out in connection with such fields as lighting, vision, hearing, sensory mechanisms, prosthetic devices, and the operation of controls. Unfortunately, this narrow approach leaves out the broader aspects of "bioengineering" which embraces all of the medical allied sciences and engineering. For example, the physiologic limits of escape from aircraft, involving an engineering approach to anoxia, frostbite, opening shock of parachutes, aeroembolism, et cetera, would not be covered by the definition of human engineering as given in this monograph.—*Commander A. P. Webster, MSC, U.S.N.*

Handbook of Nutrition, A Symposium, prepared under the auspices of the Council on Foods and Nutrition of the American Medical Association. 2d edition. 717 pages. Published for American Medical Association. The Blakiston Co., Philadelphia, Pa., publisher, 1951. Price $4.50.

This new edition of the Handbook of Nutrition has been organized into four parts titled: (1) Individual Nutrients, (2) Nutritional Needs, (3) Nutritional Deficiencies, and (4) Foods and their Nutritional Qualities. The articles have been brought together in an orderly fashion. The book is well indexed, neatly bound, and meets a definite need.

—*Commander H. J. Alvis, MC, U.S.N.*

Clinical Electrocardiography, by *Ashton Graybiel*, Captain, MC, USN, Director of Research, U. S. Naval School of Aviation Medicine, Pensacola, Fla. 198 pages; illustrated. Thomas Nelson & Sons, New York, N.Y., publisher, 1951. Price $5.

This monograph is in no way another edition of the previously published text on the subject with which the author was associated but an entirely different book with a new approach. Although it covers the field of clinical electrocardiography, it is not a textbook for the beginner because most of the discussions are technical giving in considerable detail a new and simpler method of vector analysis, the hexaxial system. The author states in the preface that "an application of this method is to be found in the manner of presenting the bipolar and 'unipolar' limb leads. It makes it possible to appreciate at a glance their true relationship and complimentary character."

It should not be inferred from the above that basic discussion and description have been neglected. The manner in which the various cardiac conditions affect the electrocardiographic tracing have been adequately and commendably covered. The chapters on arrhythmias and coronary disease are outstanding. In addition to the usually included subjects are discussions on the EKG in injuries, endocrine disorders, infections, anemia, and certain physiologic causes. The chapter on EKG in rheumatic fever is unusually sound. Yet, throughout, theoretical discussions are kept at a functional minimum.

It is commendable that consideration is consistantly given to the 12 standard leads, the bipolar and unipolar extremity leads plus the 6 accepted chest leads. Additional chest and esophageal leads are frequently included in the illustrations. The chapter entitled "The EKG in Healthy Persons," presents the clearest description of normal measurements of the various components including esophageal leads I have yet encountered. The author's style is simple, direct and descriptive. Page layout and large type on high quality paper add to the readability. The volume is profusely illustrated and adequately indexed.

—*Col. C. L. Leedham, MC, U.S.A.*

U. S. GOVERNMENT PRINTING OFFICE : O —1951